

SEPTEMBER 1988

OMSB

MODELS

2157 MONTEGO

2357 MONTEGO

2557 MONTEGO

2587 ALLEGRA

2757 MONTEGO

2767 SANTEGO

OWNER'S MANUAL

CARVER

Carver Boat Corporation • Pulaski, WI 54162-1010

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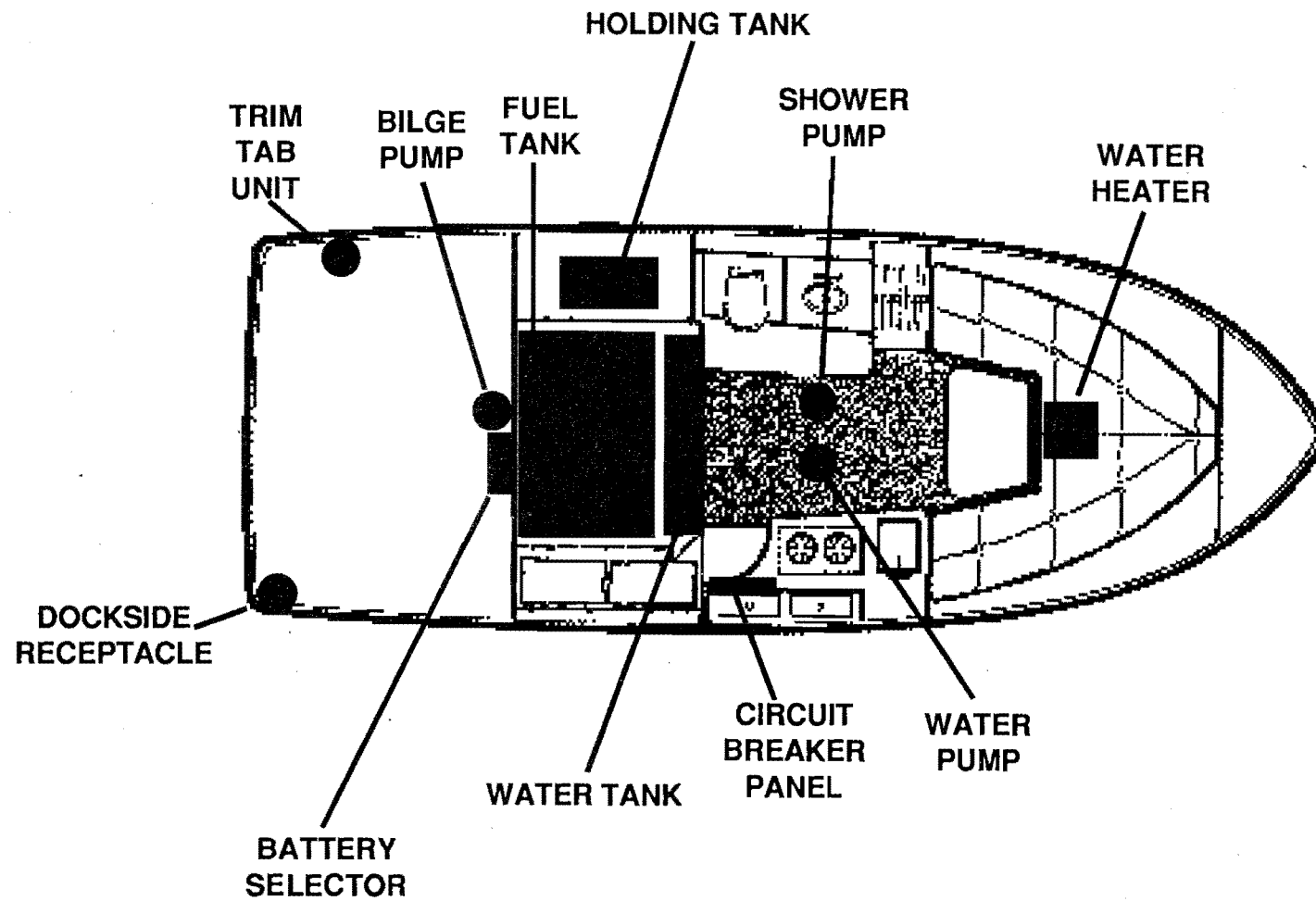
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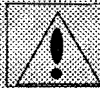
MODEL 2357 LOCATOR DRAWING



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ENGINES & DRIVE SYSTEMS

B - 1 GENERAL



WARNING

Do Not attempt to service any engine or drive component without being totally familiar with safe and proper service procedures. Certain moving parts are exposed and can prove dangerous to one unfamiliar with the operation and function of the equipment.

Carver Boat Corporation does not manufacture engines, stern drives or v-drives. These components are built by manufacturers that are specialists in this field. Because of the technical nature of the engine and drive systems, all manufacturers of these items require that warranty and service problems be taken directly to them for resolution. The Service Department of Carver Boat Corporation stands ready to assist boat owners when communicating with the manufacturers of engines and drive systems. Prior to contacting the Carver Service Department, thoroughly review any problem with your Carver dealer.



CAUTION

Use only clean, dry fuel of the type and grade recommended by the engine manufacturer. The use of incorrect or contaminated fuel can cause engine malfunction and damage.

In compliance with the Federal Safe Boating Act of 1971, all engine manufacturers require their products to be registered. A registration card is furnished with each new engine. When selling a Carver boat, the dealer, along with the purchaser, should complete the information requested on these cards and return them to the respective engine manufacturer. (Engine registration cards can be found in this manual).

Most manufacturers of the various marine power components used in these boats provides an owners manual with the product. These publications are included with this manual. Read the manual(s) carefully and become completely familiar with the proper care and operation of the engine and drive system.

B - 2 ENGINE EXHAUST

Do Not inhale exhaust fumes! Exhaust contains carbon monoxide which is colorless and odorless. Carbon monoxide is a dangerous gas that is potentially lethal.



DANGER

The carbon monoxide in exhaust fumes can be hazardous. It is important for you and your passengers to be aware of the potential safety hazard created by exhaust fumes. Familiarize yourself with the symptoms of individuals overcome by carbon monoxide, and most importantly, ways you can protect yourself and your guests.

Persons overcome by carbon monoxide may exhibit the following symptoms:

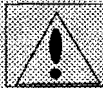
- | | |
|--------------------------|--------------|
| a. Incoherence | d. Headaches |
| b. Drowsiness | e. Nausea |
| c. Loss of Consciousness | f. Vomiting |

IF YOU THINK EXHAUST FUMES ARE ENTERING YOUR BOAT, DETERMINE THE CAUSE AND HAVE IT CORRECTED IMMEDIATELY!

The following suggestions can help prevent exhaust fumes from entering your boat:

1. Do Not allow the boat to remain stationary with the engines operating for an extended period of time.
2. Use extreme caution while operating the engines in confined areas such as enclosed slips, congested piers, or in any area where the exhaust outlets are facing or near a bulkhead or wall structure of any kind. Operation under such conditions could easily lead to exhaust gasses (carbon monoxide) entering the boat, even though you may have all the hatches, windows, doors and portholes closed.
3. Never operate the generator while the boat is moored against any other boat, dock or wall structure that is against or near the exhaust outlet. Again, operation under such conditions could easily lead to exhaust gasses (carbon monoxide) entering the boat or the boat to which you are moored, even though you may have all the hatches, windows, doors, and portholes closed.
4. Persons sleeping can be easily overcome by carbon monoxide because they are unaware of its presence. Sleeping while the engines or generator are running is not recommended. If persons are sleeping aboard while

underway, or while the generator is running, those awake should be extremely watchful for carbon monoxide accumulation in the cabin; especially the sleeping areas. Open forward facing windows or deck hatches to provide adequate fresh air ventilation. Keep hatches, windows, and doorways that face aft or towards the exhaust discharge closed.



DANGER

NEVER operate the propulsion engine(s) or generator while everyone onboard is sleeping; fatal injury may occur due to carbon monoxide poisoning.

5. Ventilate your cabin while under way. Open a forward hatch, porthole, or window to allow air to travel through the cabin. Be very careful of operating the boat with the cabin door or other windows, hatches, or portholes that face aft, open. The natural vacuum created during operation may allow exhaust gasses to be drawn into the cabin.

6. Inspect the engines exhaust system frequently.

7. Have a competent marine engine service technician inspect the exhaust system whenever the boat is in for service, or if a change is noted in the sound of the engines.

B-3 STERN DRIVE SYSTEMS



CAUTION

Always return the engine throttle lever to the extremely low speed position before shifting. **NEVER** shift the unit while engine speed is above 1000 rpm.

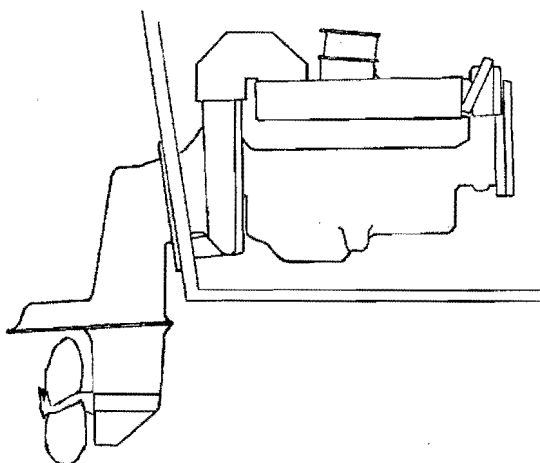


FIGURE B1 • TYPICAL STERN DRIVE

A stern drive or inboard/outboard propulsion system has a piston engine equipped with special marine components mounted near the transom and coupled to an external outdrive type transmission unit. This type of system is depicted in Figure B1.



WARNING

Running aground or striking a water borne object must be avoided. Serious damage to the stern drive or inboard underwater gear can result. In the event of such an occurrence, proceed at low speed to the nearest service facility. Have an immediate inspection made of the prop shafts and struts before further use of the craft. A boat so damaged can take on water. Keep all life saving devices readily available while driving to a dock area. If the boat cannot be immediately removed from the water, thoroughly inspect the bilge area for leaks so that the boat does not sink while moored.

Consult the Engine Owners Manual that has been provided with this manual for additional information regarding operation and maintenance.

B - 4 ENGINE COOLING SYSTEMS

All marine engines use surface water as a cooling medium. The cooling water employed enters the system through a water intake and is relinquished through the exhaust manifolding system.

Most stern drive units have the water intake and exhaust system incorporated into the outdrive. See the Engine Owners Manual for additional information.



CAUTION

Should an engine intake, exhaust, or cooling hose rupture, turn the engine off and close the appropriate gate valve immediately. Proceed under tow if necessary to a service facility for appropriate repairs; maintain a close visual watch on the problem hose. Also, monitor the bilge water level.

Installation of "Fresh Water Cooling" provides adequate engine cooling without exposing the internal engine cooling system to the detrimental effects of surface water. Fresh Water Cooling is recommended when the boat will be operated in salt, highly polluted, or silt laden water. Ask a Carver dealer for recommendations regarding the necessity of fresh water cooling in the boating area to be used. The Engine Owners Manual provides additional information regarding service and maintenance of this equipment.

B - 5 PROPELLERS

Knowledge of the propeller is most easily gained through better understanding of the terminology used to refer to the aspects of propeller size and performance.

A. Diameter

Diameter is twice the distance from the center of the prop shaft to the extreme tips of propeller blades. Increasing or decreasing propeller size will have a direct bearing on the RPM's an engine will develop. This is due to the greater amount of propeller blade surface in contact with the water. See Figure B2.

B. Pitch

Pitch is a measure of helix angle (or angle of attack) of the rotating blade. Pitch is easily understood by imagining the propeller rotating through a semi-solid such as butter or jello. The distance the propeller will travel in one revolution is called "Pitch." Increasing or decreasing pitch will have a direct bearing on engine RPM's because of the greater bite taken by the blade with each rotation. See Figure B2.

C. Prop Slip

When traveling through water a propeller is unable to get a complete bite because of the fluidity of water. "Prop Slip" is usually expressed as a percent of the computed theoretical speed. Twenty-five to thirty-five percent prop slip is common for a cruiser type boat operating at cruising speed.

From the definition given, the deduction can be made that a propeller, of a given diameter, with a 10 inch pitch, rotating at 3600 revolutions per minute, with a

prop slip of 30%, would move the boat at a rate of 24 miles per hour.

Changing either diameter or pitch will have an effect on engine speed and prop slip, and in turn, directly effect the performance of a boat. The propeller(s) included with each Carver boat provide the best general performance based on data obtained from on-the-water testing of that model. Variations in load, operating conditions, environment, the individual engine and hull performance may necessitate the purchase and use of another propeller(s).

Under your normal load conditions the engine(s) should turn within the maximum RPM range when at full throttle. If the engine(s) exceeds the recommended RPM an increase in pitch or diameter is required. A decrease in pitch or diameter required if engine RPM is too low.

An engine that is not developing full power, and the load carried in a boat, will directly effect performance of the engine. Always be sure the engine is properly tuned, and that load conditions are those normally experienced, before changing propellers.

For a further explanation of conditions effecting propeller RPM, see a Carver dealer.

B - 6 ENGINE INSTRUMENTATION

Each pilot station is equipped with a complete set of engine instruments. These instruments allow the pilot to constantly monitor the operational condition of the engine. Diesel engine boats may use visual indicators instead of gauges. Close observation of these instruments could save the engine from damage.

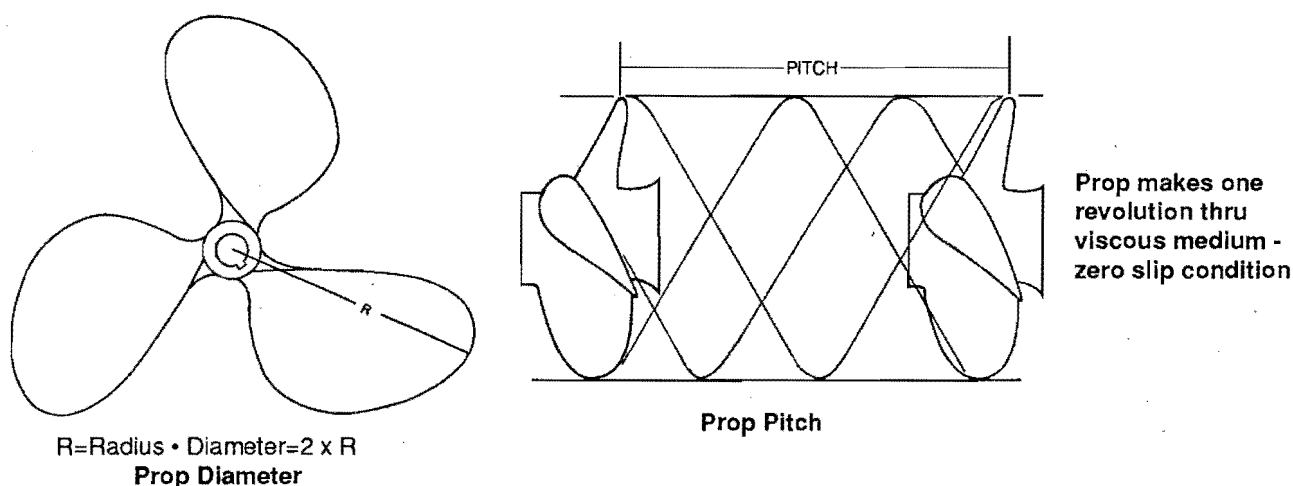


FIGURE B2 • PROPELLER THEORY

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CAUTION

If so equipped, be sure the Ignition Switch at the unoccupied station of a dual station boat is in the OFF position. Failure to comply will result in the inability to shut down the engines.

A. Tachometer

The Tachometer indicates the speed of the engine in revolutions per minute. This speed is not the boat speed nor necessarily the speed of the propeller. The Tachometer may not register zero with the Ignition Key in the OFF position.



CAUTION

Never exceed the maximum recommended operating RPM of your engine. Maintaining maximum, or close to maximum RPM for extended periods can reduce the life of the engine.

B. Temperature Gauge

The temperature gauge monitors the cooling system of the engine. A sudden increase in the temperature could be a signal of a blocked cooling passage or a water pump malfunction.



CAUTION

Operation of an overheated engine can result in engine seizure. If an unusually high temperature reading occurs, shut the engine off immediately.

C. Oil Pressure Gauge

The Oil Pressure Gauge provides an indication of the pressure in the engine lubrication system. A drop in oil pressure is a possible indication of oil pump or leakage problems.



CAUTION

Operation of an engine with abnormally low oil pressure can lead to engine damage and possible seizure. Have the engine serviced immediately upon a reduced oil pressure indication.

D. Voltmeter

The voltmeter monitors the battery condition. See Section E for additional information on voltmeter operation.

E. Fuel Gauge

The Fuel Gauge displays the level of fuel that is present in the fuel tank(s). See section E for more detailed information on fuel gauge operation.

F. Power Trim Gauge

Boats equipped with MerCruiser Stern Drives also have a "Power Trim Gauge." This gauge provides a visual indication of the inward-outward position of the outdrive. If the boat is equipped with a second control station, an optional Power Trim Gauge can be added to that station.

G. Engine Alarm Systems

Engine alarm systems are installed on some models with specific types of engines. The alarm is an audible alarm that is mounted in the helm area; it is actuated by engine water temperature and engine oil pressure senders. The alarm will sound in the event of low engine oil pressure or high engine water temperature.

The engine alarm will sound during engine startup, or whenever the Ignition Switch is positioned to ON and the engine is not operating. The alarm sounds under these conditions because engine oil pressure is low; the alarm will cease to sound as soon as engine oil pressure rises to the proper level.

IMPORTANT: The engine alarm systems installed in these boats monitors only engine water temperature and engine oil pressure. Always maintain a close visual watch on the drive(s), transmission(s), engine fluid levels, bilge water level, etc.

H. Engine Synchronizer

Most dual engine Carver models can be equipped with an optional engine synchronizer. This instrument compares the electrical signals generated by the engines and converts those signals to a visual meter indication of engine speed difference. The meter movement responds to changes in throttle position. When the needle is centered, the engines are in proper synchronization.

I. Instrument Maintenance

Electrical protection for instruments and ignition circuitry is provided by a fuse or circuit breaker on the instrument panel.

Periodically, spray the Ignition Switch(s) with a contact cleaner/lubricant such as LPS, CRC or WD40. The

Ignition Switch(s) and all instruments, controls, etc. should be protected from the weather when not in use. Carver offers appropriate weather covers for each model. Excessive exposure can lead to gauge and Ignition Switch difficulties.

Electronic gauges are affected by static electricity that builds-up on the glass face. Periodic washing of the gauge face with warm water and mild liquid detergent will help eliminate the static electricity problem and improve gauge accuracy.

PROPULSION EQUIPMENT

MODEL	ENGINES	REDUCTION	PROP
2157	3.7L MERC 4.3L MERC 5.7L MERC 171 VOLVO 205 VOLVO DUO PROP	1.84:1 1.84:1 1.50:1 2.15:1 2.3:1	16 X 14 16 X 16 16 X 16 16 X 13 B-6
2357	4.3L MERC 5.7L MERC 205 VOLVO DUO PROP 271 VOLVO DUO PROP	1.84:1 1.50:1 2.3:1 1.95:1	14-1/2 X 17 14-1/2 X 17 B-5 B-5
2557	Single 5.7L MERC 7.4L BRAVO MERC 271 VOLVO DUO PROP Twin 3.7L MERC 171 VOLVO	1.50:1 1.5:1 1.95:1 1.84:1 2.15:1	16 X 16 15-1/2 X 17 RH SS B-5 13-3/4 X 21 16 X 17
2587	Single 5.7L MERC 7.4L BRAVO MERC 271 VOLVO DUO PROP TWIN 5.0L MERC 231 VOLVO DUO PROP	1.50:1 1.5:1 1.95:1 1.5:1 1.95:1	16 X 16 15-1/2 X 17 RH SS B-5 14 X 19 B-6
2757	Single-Gas 271 VOLVO DUO PROP Twin-Gas 3.7L MERC 4.3L MERC 171 VOLVO 205 VOLVO DUO PROP Twin-Diesel AQAD 31 VOLVO DUO PROP	1.95:1 1.84:1 1.84:1 2.15:1 2.3:1 2.3:1	B-4 14 X 19 13-3/4 X 219 16 X 15 B-7 B-5
2767	Single-Gas 271 VOLVO DUO PROP Twin-Gas 3.7L MERC 4.3L MERC 171 VOLVO 205 VOLVO DUO PROP Twin-Diesel AQAD 31 VOLVO DUO PROP	1.95:1 1.84:1 1.84:1 2.15:1 2.3:1 2.3:1	B-3 14 X 17 13-3/4 X 21 16 X 15 B-6 B-5

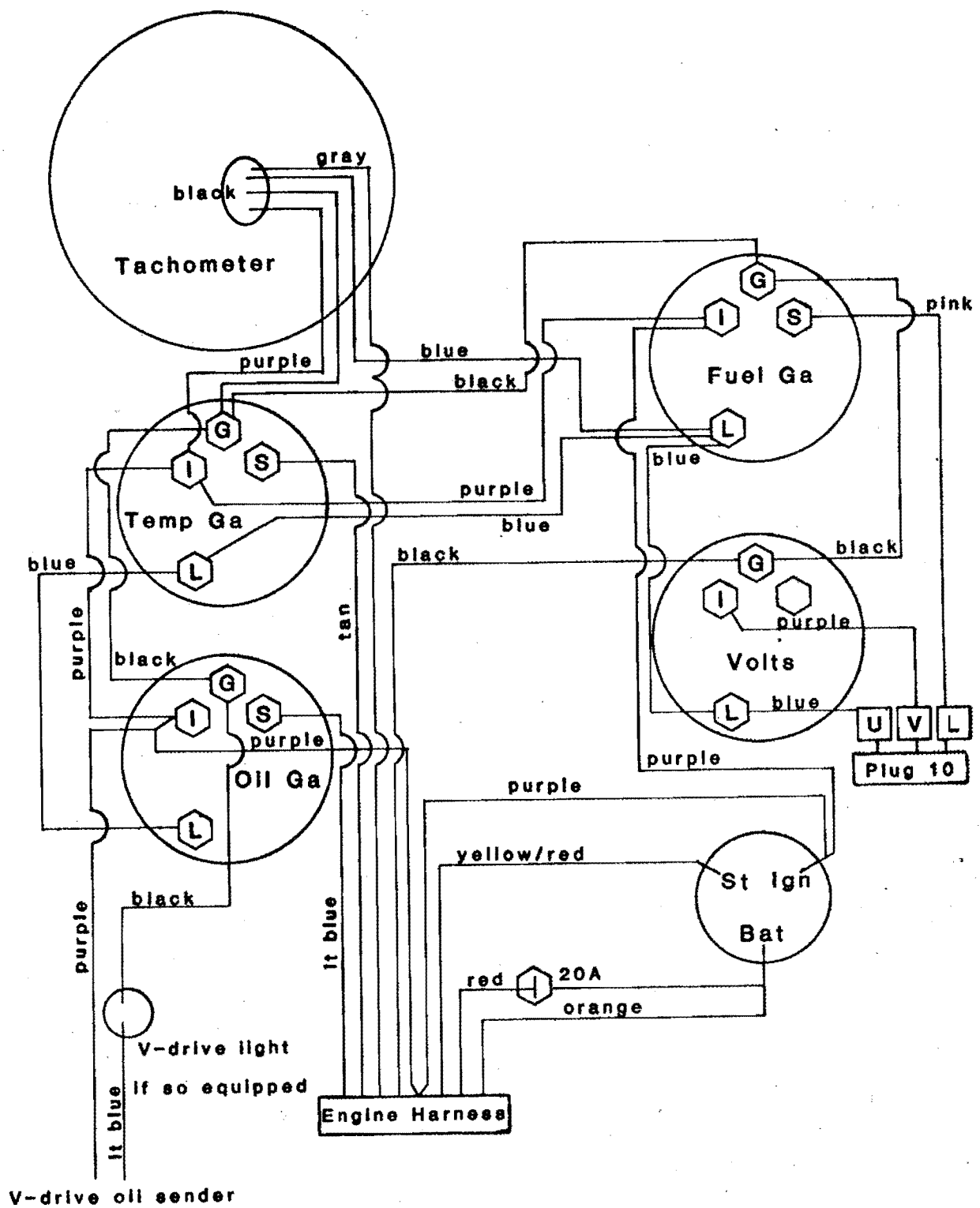


FIGURE B3 • SINGLE GAS ENGINE INSTRUMENT WIRING DIAGRAM

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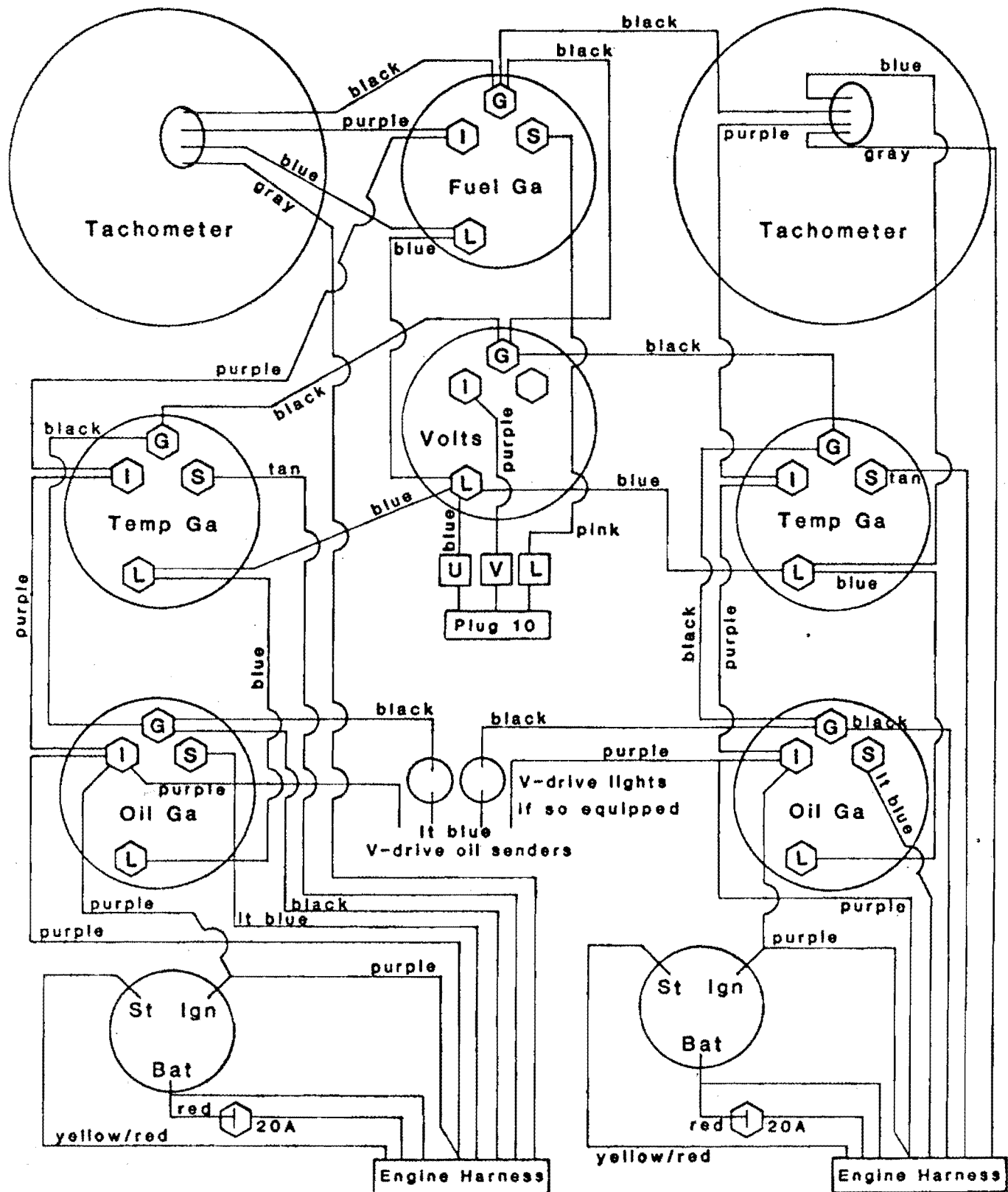
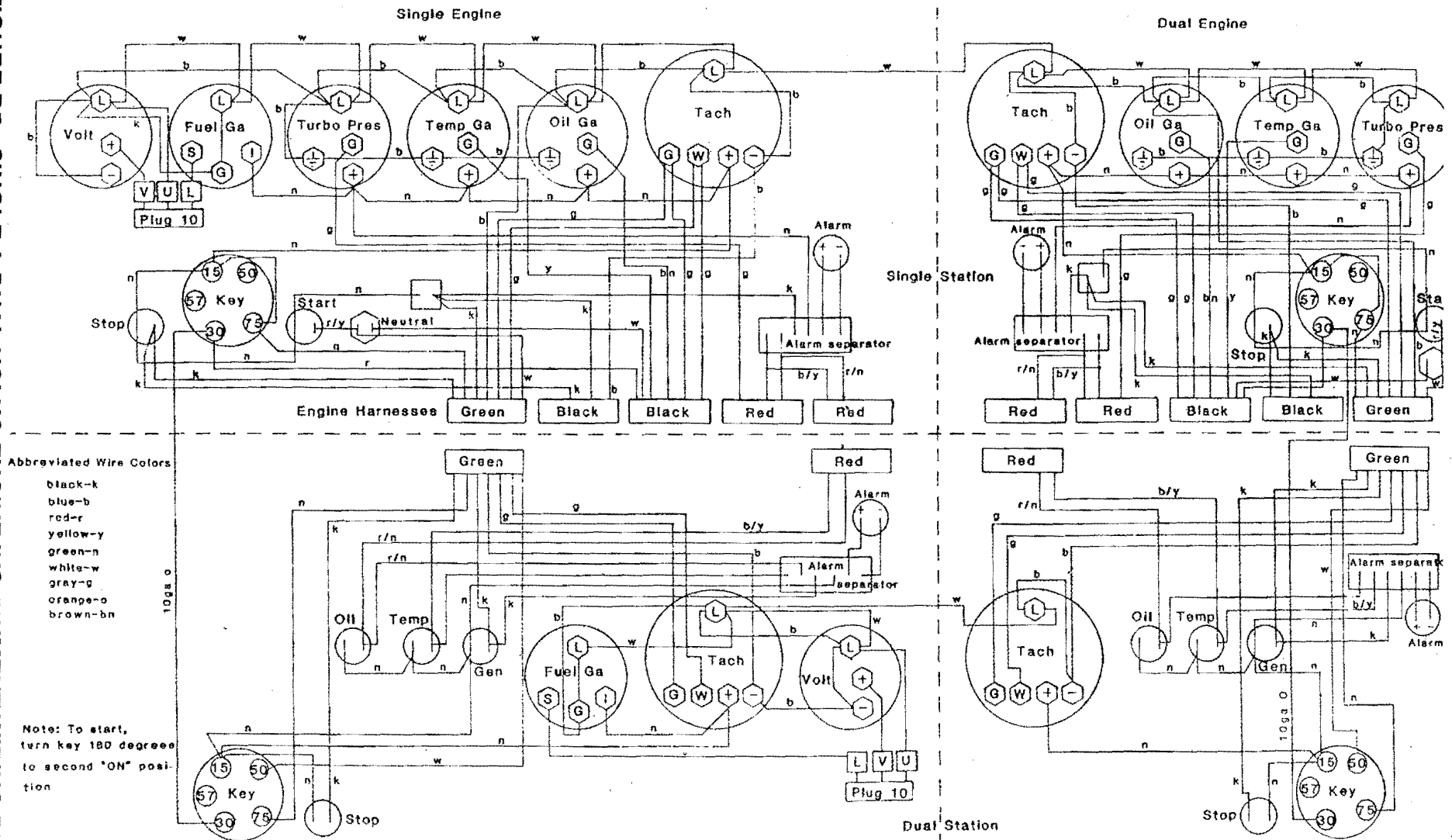


FIGURE B4 • DUAL GAS ENGINE INSTRUMENT WIRING DIAGRAM

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FIGURE B5 • SINGLE & DUAL VOLVO ENGINE INSTRUMENT WIRING DIAGRAM



CONTROL SYSTEMS

C - 1 GENERAL

The remote control systems which permit operation of the engine's throttle and shift mechanisms consist of three major components, the control, the throttle and the shift cables. The various types of controls and their operation are discussed in section C-2.

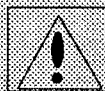
The cables are all push-pull type. Two cables are required. One connects the remote throttle control to the carburetor and the other connects the remote shift control to the outdrive or transmission shift linkage.

C - 2 CONTROL OPERATION

The various mounting locations, number of control stations with which the boat is equipped and the type of engine installed are all important in determining the type of control to be used. Each control is equipped with a means of permitting the engine to be operated at high speed while in neutral for cold starting and warm-up purposes.

During the general operation of a dual engine boat, it is advantageous both engines should be operated at the same rpm. This reduces noise, and vibration and can increase engine efficiency. Setting the throttles so the engines are running the same rpm (synchronized) can be done by the engine sounds or you can purchase an instrument (Engine Synchronizer) as described in Section B. Attempting to synchronize the engines solely by using tachometer readings or control lever placement generally will not work. When the engines are in proper synchronization, the throttle levers may not necessarily be even.

See the information provided by the control manufacturer. Details on control operation and maintenance are provided therein. Also see the Engine Owners Manual.



CAUTION

Always return the throttle lever to the extreme low speed position before shifting. **Absolutely Never shift the unit while engine speed is above 1000 rpm**

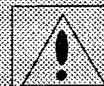
C - 3 NEUTRAL SAFETY SWITCH

Every control system has a neutral safety switch incorporated into it. This device prohibits the engine from being started while the shift lever is in position other

than the neutral position. If the engine will not start, slight movement of the shift lever may be necessary to locate the neutral position and disengage the safety cut-out switch. Control or cable adjustments are required to correct this condition should it persist. See your Carver dealer for necessary control and cable adjustments.

C - 4 DUAL STATION CONTROLS

Boats equipped with a dual station control system utilize "station-to-station" cables to interconnect the upper and the lower stations. Due to the added machinery, a dual station control system is inherently stiffer operating than a single station. This is usually more noticeable at the upper station.



CAUTION

When operating the boat, the controls at the unoccupied station must not be touched. Impeded or loss of control can result.

C - 5 CONTROL SYSTEM MAINTENANCE

Periodic inspections of the control(s), cables, and all connections should be made. Signs of rust, corrosion, wear, cable jacket cracks or other deterioration require immediate system servicing. If your unit is equipped with electric shift, inspect the shift wire for fraying, embrittlement and insulation cracks. Repair all noted deficiencies.

Generally, periodic lubrication of all moving parts and connections with a light, waterproof grease is in order. Cables can be lubricated by positioning them to their fullest extension and applying light grease to the inner cable near the jacket. Working the cables back and forth will distribute the grease in the inner cable. Re-apply the grease if necessary.

Lubrication should be performed as often as necessary to keep the system operating smoothly. Cable manufacturers such as Teleflex and Morse often offer special tools to make cable lubrication easier.

Cable and control adjustments may become necessary. Adjustment screws in the control, on the cables and in the linkage are provided.



CAUTION

Do Not attempt control adjustments unless you are familiar with servicing control systems service procedures. Control misadjustment can cause loss of control.

Other lubrication, adjustment and maintenance instructions are included in the information provided by the control manufacturers.

STEERING SYSTEMS

D - 1 GENERAL

A. Mechanical Steering

Most single station Carver boats use a rack and pinion type mechanical steering system. In this system, a pinion gear in the steering helm drives a gear rack attached to the helm end of the steering cable. A rotary rack is sometimes used. Though the appearance is different, the concept is the same. The steering cable is of the push-pull type. As the wheel turns, the pinion drives the rack which pushes or pulls the steering cable. The steering cable on a stern drive model connects to the outdrive steering linkage, or the power steering unit if so equipped.

B. Hydraulic Steering

Most dual station Carver models use hydraulic steering. The Hydraulic Steering System consists of three major components: the helm assembly, a pressurized reservoir, and the hydraulic cylinder. The helm assembly acts as a pump to move the oil through the system. In many aspects this type of steering is similar to the mechanical system. Instead of activating a cable, turning of the helm causes fluid in the hydraulic hoses to flow and activate the hydraulic cylinder causing the rudders or outdrive to turn.

As the wheel is rotated, a slight clicking sound may be noted. This clicking sound is the opening and closing of the valves in the helm unit and is normal.

As the steering wheel is turned, the water flow past the rudders, or outdrive, places a load on the steering system. The effort required to turn the steering wheel remains constant regardless of speed or outdrive position. This is an advantage when the boat is "on plane". The lack of steering effort can be a disadvantage at lower speeds because the effort is not reduced to where it can turn lock-to-lock easily.

The torque tab, on stern drive models with hydraulic steering, must be properly adjusted; see section D-3. Though the helmsman may not feel propeller torque on the wheel, an improperly adjusted torque tab can cause steering difficulties.

For additional information, see the Steering System Manufacturer's literature that is included with this manual.

D - 2 OUTDRIVE POSITION INDICATOR

Some Morse helm assemblies are equipped with a rudder position indicator. This device indicates the location of the stern drive relative to the straight ahead position. The position indicator operates mechanically. Proper adjustment and free operation are essential if proper rudder position indications are to be provided. Periodic lubrication of all moving parts within the rudder position indicator is necessary to maintain smooth operation.

D - 3 PROPELLER TORQUE

Propeller rotation by a single engine installation will exert a directional force on the steering system. This action can cause steering to be harder in one direction than the other; this is referred to as propeller torque.

Stern drive units are equipped with an adjustable tab on the drive unit to compensate for propeller torque. This tab is used to attain a neutral steering condition at normal operating speed. When this condition is attained, equal force will be required to turn the steering wheel to both port and starboard. See the Engine Owners Manual for more data.

Propeller torque can also prevent the boat from following a straight line, or to wander when operated at very low speed. This condition is normal and can be corrected by increasing engine rpm. Wind, water currents and play at steering conditions can cause equivalent effects.

D - 4 POWER STEERING

Boats equipped with MerCruiser stern drives are, or can be, equipped with MerCruiser power steering. This is a "power assist" system and can greatly reduce steering efforts. However, this system is not a full power steering system as used in automobiles, some steering tension remains in the system.



CAUTION

DO NOT force the steering unit to either extreme. This can place undue strain on the unit and can lead to hydraulic line or seal failure.

Upon commissioning the boat, the system must be purged of air. Should steering difficulty increase with

time, additional bleeding of the system may be required. See a dealer; adjustments on a power steering unit must be performed by a qualified service technician.

Proper power steering fluid level must be maintained. See the information provided by the power steering manufacturer for additional information.

D - 5 POWER STEERING MAINTENANCE

Make a periodic inspection of all steering cables, linkage and helm assemblies. Immediately correct signs of corrosion, cracking, loosening of fastenings, excessive wear, or deterioration. Failure to do so could lead to steering system failure and loss of control.

Adjust the helm and cable assembly so that the system is centered with the rudders or outdrive in the straight ahead position. The steering wheel should be able to be rotated an equal number of turns to port and starboard from the straight ahead position. If adjustment becomes necessary, see your Carver dealer.

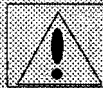
All cables, helm assemblies, and steering connections should be periodically lubricated with a light, waterproof grease. See the manufacturers information provided with this manual.

Hydraulic steering systems must have all air purged from system periodically. Some hydraulic steering systems must be pressurized to achieve optimum operation. These systems usually require 20-30 psi pressure. Review the information provided by the hydraulic steering manufacturer for proper system specifications and details regarding system service and maintenance.

ELECTRICAL SYSTEMS

E - 1 GENERAL

All electrical equipment on Carver boats operates on either 12 volt DC or 120 volt (220 volts on 50 Hertz models) AC electrical power. An understanding of the systems and their operation can be easily gained through a study of the major components which comprise the electrical circuitry. Section E describes the 12 volt system and the related operation. Also in Section E is a description of the 120 (220) volt system.



WARNING

DO NOT tamper with any electrical connection, panel or harness, or attempt installation of any electrical equipment unless thoroughly familiar with the systems and are experienced in making such installations.

E - 2 BATTERY SYSTEMS

A Single Battery Systems

A1 Installation

A single 12 volt DC battery is standard equipment on certain models. A Battery Selector Switch (see the Locator Drawing in Section O for the exact location of the Battery Selector Switch) is provided on models with 2 batteries.

Connect the battery in the following manner:

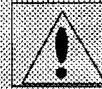
1. Connect the red battery cable from the Battery Selector Switch to the positive (+) terminal of the battery.
2. Connect the black cable from the engine to the negative (-) battery terminal.
3. Also connect the black lead from the power trim pump, if so equipped, to the negative (-) battery terminal.
4. Other black leads for 12 volt equipment, such as those labelled A, A1, and AD, must also be connected to the negative (-) battery terminal.

A2 Operation

All factory installed 12 volt equipment, except for the automatic bilge pumps and the voltmeter, are connected to and controlled by the Battery Selector Switch

or the main circuit protection device (either fuse or circuit breaker).

The OFF position of the Battery Selector Switch will completely shut off 12 volt electrical power. The only exceptions are the voltmeter (described in Section E) and automatic bilge pump (described in Section E). Always turn the Battery Selector Switch to the OFF position or place the main circuit breaker in the OFF position when the boat is left unattended for an extended period.



CAUTION

DO NOT place the Battery Selector Switch in the OFF position when the engine(s) are operating; alternator or wiring damage could result.

Positioning the Battery Selector Switch to the #1 position will provide power to the 12 volt electrical system. In single battery installations, the #2 position of the Battery Selector Switch is not functional.

IMPORTANT: Extended use of 12 volt equipment without operating the engine or charging the battery could seriously damage the battery.

B Dual Battery Systems

B1 Installation

The Battery Selector Switch (see the Locator Drawing in Section O for the exact location of the Battery Selector Switch) that is provided on models with two batteries enables DC power to be used from either or both batteries.

When installing the batteries, proceed as follows:

1. Connect each of the two red cables leading from the Battery Selector Switch to the positive (+) terminal on each of the two batteries.
2. Connect each of the black cables from the engine to each of the negative (-) battery terminals. On dual engine boats there will be one black cable coming from each engine. Single engine boats will have two black cables coming from one engine. Any black leads for the power trim pump, etc. must also be connected to the negative (-) battery terminal.

3. The black leads from the 12 volt distribution panel labelled **A** must be connected to the negative (-) battery terminal.

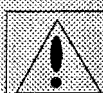
4. If the boat is equipped with a battery charger, connect the red leads labelled C1, C2, and C3 to the positive (+) terminals of batteries 1 & 2 (and the generator battery if so equipped). Also, connect the black ground wire C1 to the negative (-) terminal of any battery.

B2. Operation

Power to the engines and all 12 volt electrical equipment, except the automatic bilge pump and voltmeter, is controlled by the Battery Selector Switch.

Battery Selector Switch Positions:

"OFF" - With the Battery Selector Switch in the OFF position, all 12 volt power to the boat is shut off except for the bilge pumps and voltmeter. Always turn the Battery Selector Switch to the OFF position when the boat is unattended for an extended period.



CAUTION

DO NOT turn the Battery Selector Switch to the OFF position while an engine is running; alternator and wiring damage could result.

"1" - Position 1 will use battery #1 to power both engines and all 12 volt equipment. Battery #2 will be isolated and remain in reserve. Battery #1 will be charged by the alternator(s).

"2" - Position 2 will use battery #2. Except for automatic bilge pumps and voltmeter, battery #1 is isolated and remains in reserve. Battery #2 will be charged by the alternator(s).

"ALL" - With the Battery Selector Switch in the ALL position, the batteries are connected in parallel. Both batteries will be used by the engines and all 12 volt equipment.

The use of one battery at a time is recommended. Use one battery at a time by positioning the Battery Selector Switch to either the #1 or #2 position. Avoid using the ALL position. Use the ALL position only when a single battery is not capable of starting the engine(s).

Alternate battery usage increases battery longevity. Use battery #1 for the first day of a cruise and switch to battery #2 on the second day.

Monitor the voltmeter. Position the Battery Selector Switch to the battery that has sufficient power to start the engine(s). Start each engine independently; never try to start both engines simultaneously. After the engine(s) is operating, position the Battery Selector Switch to the battery that has the lowest charge. This will allow the

alternators to charge the low battery. Utilizing the Battery Selector Switch in this manner (instead of using the ALL position) will supply a greater charge to the battery.

FOR EXAMPLE: If battery #1 is fully charged and battery #2 is in need of a charge, use battery #1 to start the engine(s). After the engine(s) are operating and warmed-up, turn the Battery Selector Switch to the #2 position. This will permit the alternators to charge the low, #2 battery.

E - 3 BATTERY CARE & MAINTENANCE

Keep the batteries charged and filled to the proper level with distilled water. Keep the batteries clean, especially the terminals and connection lugs. Be sure the batteries are fastened securely while in use.

IMPORTANT: If a 120 volt battery charger is used, be sure the 120 volt neutral lead of the charger is isolated from the ground or bonding circuit. Be sure the battery charger is of the type which properly senses battery requirements and does not overcharge or cause the electrolyte to boil.

Periodically inspect all electrical wiring to ensure clean secure connections. Also, inspect for nicks, chaffing, embrittlement, improper support, etc. Have any defects corrected immediately by an experienced marine electrician.

E - 4 VOLTMETER USE & OPERATION

Voltmeters are provided to monitor the condition of the batteries. Replenish a battery indicating a low charge. Determine the reason for the discharge. Lack of battery usage is as detrimental to battery longevity as is over use. Alternate battery usage is important.

When two batteries and a single Voltmeter are provided, a Voltmeter Switch is supplied on the helm control panel. When the engine(s) is not running and the battery charger is off, depressing the Voltmeter Switch towards position #1 will indicate the voltage of battery #1. Similarly, the voltage of battery #2 will be indicated with the switch depressed towards #2. The center position is off. When the Voltmeter Switch is employed during engine operation, the voltage of the

respective battery, plus any electrical charges supplied to it, will be indicated on the Voltmeter.

IMPORTANT: Be sure the Voltmeter Switch is in the OFF position when not in use, especially while the boat is unattended. The voltmeter is independent of the Battery Selector Switch and if left on, it will drain the charge from the batteries.



CAUTION

Carver does not recommend the installation of 12 volt ammeters. The voltage drop due to the ammeter circuitry is substantial. This severely reduces the charging capabilities, and under certain situations can cause the charging circuit wiring to overheat.

E - 5 12 VOLT ELECTRICAL EQUIPMENT

A. Helm Equipment

Panel Lights - The Panel Lights Switch is used to activate the helm console panel lights.

Horn - The HORN Switch sounds the horn for as long as switch is manually held depressed.

Wipers - The WIPER Switch activates the windshield wipers. On dual station boats, a WIPER Switch is not provided at the upper station.

Spotlight - The Spotlight controls are in the dash panel. For further information regarding spotlight use and operation, refer to the manufacturers literature.

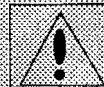
Nav. & Anchor Lights - Moving the NAV/ANCHOR Switch towards the NAV position activates the side, stern, and 20 pt. light. Move the Switch to the ANCHOR position to activate the anchor light. The center position of the switch is OFF.

NOTE: Some models have independent switches for the Nav and Anchor lights.

Fuel Gauge - Boats equipped with a single tank have a fuel gauge that will register the fuel level when the Ignition Switch is in the ON position. Models equipped with two tanks either have two Fuel Gauges or a dual position FUEL Switch. If a FUEL Switch is provided, fuel level is determined by placing the Ignition Switch in the ON position and moving the FUEL Switch towards the position that indicates the desired tank. The FUEL Switch is spring-loaded to return to the center-OFF position upon release.

Voltmeter - The Voltmeter will register the amount of charge available at the battery or batteries. If a boat is equipped with two batteries and one voltmeter, a Voltmeter Switch will be provided to permit selection of the desired battery.

Bilge Blower - The BLOWER Switch is used to activate the bilge blower. The bilge blower is used to remove any gas vapors that may have accumulated in the bilge or engine areas. On dual station boats, the blower can only be turned off at the station from which it was activated.



WARNING

Be sure to operate the bilge blower for at least five minutes before starting an engine or generator, or whenever operating the engine(s) at idle speed. Check the bilge blower output before each use. Refer to section H for bilge blower check-out procedures.

Bilge Pump - Bilge Pumps are used to remove water from the bilge (bottom of the hull) area of the boat by pumping that water overboard. The Bilge Pump Switch is used to either cause continuous operation of the Bilge Pump(s) or, operation when a predetermined level of water accumulates in the bilge. Continuous Bilge Pump operation is caused by placing the Bilge Pump Switch in the CONTINUOUS position. When in the AUTOMATIC position, the bilge pump will be activated automatically. Automatic operation will commence whenever bilge water rises to a level that will cause the bilge float switch to move upward.

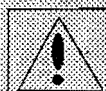
The Bilge Pump will remain active if placed in the AUTOMATIC position even if the Battery Selector Switch is the OFF position. The Bilge Pump circuitry is connected directly to the batteries and is protected by inline fuses or circuit breakers that are located near the Battery Selector Switch.

IMPORTANT: Before leaving your boat unattended for an extended period, ensure that the Bilge Pump Switch is in the AUTOMATIC position. This will provide automatic draining of the bilge should a leak develop while the boat is unattended. Check the water level in the bilge often.

Trim Tabs - The Trim Tabs are used to cause the bow of the boat to move up or down while underway. This action in turn can cause more efficient operation of the boat. If the boat is equipped with Electric-Hydraulic trim tabs, the trim tabs are controlled by the Trim Tab Up or Trim Tab Down Buttons. Section J contains additional information regarding usage of the Trim Tabs.

B. Interior Equipment

The MAIN circuit breaker protects all 12 volt distribution circuitry. There are also individual circuit breakers for items such as the refrigerator, stereo, interior lights, etc. A separate fuse may be mounted in the cockpit when the optional cockpit washdown system is installed. Section G has additional information regarding the cockpit washdown system.



CAUTION

Use only replacement fuses that are of equal rating to the original fuses. Refer to the defective fuse or the electrical drawing for proper size.

C. Head Electrical Equipment

Shower Pump - Shower pumps are used to discharge shower water overboard. The shower pump is activated either by a manually-operated switch that is located near the shower or by an automatic sump system.

If the boat is equipped with a Switch labeled SHOWER, place this Switch in the ON position to activate the shower pump and thereby discharge shower drain water overboard; place this Switch in the OFF position when done.

If the boat is equipped with a shower sump system, shower water will automatically be discharged overboard as soon as the water level in the shower water sump reaches a level that will cause the float switch in the sump to rise to a predetermined level. The pump will automatically shutdown when shower water ceases to flow.

NOTE: Regardless of the type of shower pump activation with which the boat is equipped, the Shower Circuit Breaker must be in the on position for either system to function.

Pressure Water - Water is delivered to all output devices, e.g., faucets, by means of pressure. Pressure to deliver the water is created by the Pressure Water Pump. The pressure water pump will operate automatically on-demand as long as the Pressure Pump circuit breaker is in the ON position. When the water tanks aboard the boat are empty, place the pressure pump circuit breaker in the OFF position.

NOTE: If the boat is not equipped with a Water Level Gauge, water level can be determined by viewing the water tank. Water tanks are normally located below the floor in the bilge area and can be accessed by removing

the related floor panel. See the locator drawing in Section O for exact location of the water tank(s).

D. Installation of Additional 12 Volt Equipment

Negative and positive terminal blocks are installed near the helm switch panel. Leads for non-factory installed 12 volt accessories can be connected to these terminal blocks.



CAUTION

Be sure to provide proper fuse or circuit breaker protection for all 12 volt equipment that is installed. Do Not overload the accessory circuitry by installing too much additional 12 volt equipment.

All of the items listed in section E-5A, B & C are protected at the main circuit breaker or fuse panel. Fuses or circuit breakers for the voltmeter and automatic bilge pump are located near the Battery Selector Switch. The instrument and ignition fuses or circuit breakers are located on the helm control panel.

E-6 120 (220) VOLT ELECTRICAL SYSTEM

The boat may be equipped with 30 amp, 120 volt, 60 Hertz (or 15 amp, 220 volt, 50 Hertz) AC electrical wiring. When the boat is connected to a shore power outlet, the AC system supplies electrical power to items such as dual voltage refrigerators, stoves, battery chargers, and receptacles. See the Locator Drawing in Section O for exact location of the Dockside receptacles.

E-7 AC SYSTEM GENERAL INFORMATION

The dockside system uses three-wire, color-coded circuitry. The black or hot wire is the ungrounded current carrying conductor. The white or neutral wire is the grounded current carrying conductor. The bare copper or green wire, referred to as the "equipment ground," is a grounded conductor, and under normal conditions is not a current carrying wire. The neutral wires are connected together at a buss bar. The equipment grounds are similarly connected together at another buss bar. Each hot wire is connected to, and protected by, a circuit breaker in the distribution box.

The distribution box houses the system circuit breakers. The standard dockside system has a MAIN circuit breaker which protects the overall distribution network. The main breaker protects both the hot and neutral input leads. The MAIN breaker will also trip if reverse polarity should occur. This breaker is very sensitive. The resulting power surge which occurs when connect-

ing in the shore power cord may cause the MAIN breaker to trip. To avoid this power spike, turn off all MAIN breakers before plugging in the shore power cord(s). Securely connect the power inlet of the boat and the shore power receptacle. If the connection is broken and later re-secured, the circuit breaker will trip. Connections must be secure for uninterrupted dockside service.

If the boat is equipped with dual dockside, a second distribution system, that is similar to the one previously described, is provided. This is a completely separate system which includes another main breaker, power inlet, dockside cord, etc. The second AC system is normally provided whenever equipment that requires large amounts of current (e.g., air conditioning) is provided.

E - 8 DOCKSIDE OPERATION

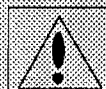


CAUTION

Should any abnormalities appear during dockside operation, disconnect the system immediately. Have the system of the boat and the shoreside receptacles checked as soon as possible.

A. General

Appropriately labeled breakers control actuation of the electric stove and electric hot water heater. The electric stove also has heat controls governing the burner elements.



CAUTION

DO NOT supply electrical power to an empty hot water heater. Be sure there is a substantial water supply. Prime the system before supplying power to the heater. Failure to comply will result in damage to the heater element.

The AC receptacles can be used for 120 volt (220 volts on 50 Hertz models) household appliances.



CAUTION

DO NOT overload the receptacle circuits. Following is a listing of equipment and the electrical currents usually required to operate these items. Most receptacle circuits are capable of handling 15 amperes. For 220 volt, 50 Hertz models, divide all of the current ratings by 2.

AC EQUIPMENT ELECTRICAL LOADS

Air Conditioners	See motor load plate
Battery Chargers	Up to 800 watts (7.3 amps)
Blankets (Electric)	50 to 200 watts (2 amps)
Coffee Makers	550 to 700 watts (6.3 amps)
Electric Drill	See motor load plate
Fans	25 to 75 watts (0.7 amps)
Fry Pan	1350 watts (12.3 amps)
Heater	1500 watts (13.7 amps)
Lights	wattage as marked
Television	200 to 300 watts (2.7 amps)
Toaster	800 to 1500 watts (10.5 amps)
Vacuum Cleaner	See motor load plate

Usually, the power requirement is specified on the electrical item. The table previously listed is only an approximation of the electric current usage normally experienced.

Some boats are equipped with optional volt and amp meters. If so equipped, monitor these meters; amperage draw must not exceed 30 amps (15 amps on 50 Hertz systems).

B. Shore Power Connections



CAUTION

Use only equipment with approved three wire electrical plug connections. Be sure each item being used has been tested and is free of electrical shorts and ground faults.

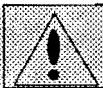
Fifty foot, ten gauge, three wire, shore power cords are provided with dockside wiring. The shore power cords on 60 Hertz systems have 30 amp twistlock type connectors. This connector is approved by Boating Industry Association, and the American Boat and Yacht Council. Always connect the cord to the power inlet receptacle of the boat before making connections to the shore power source.



CAUTION

DO NOT use a two-wire adaptor or connect to a three-wire system. These do not provide adequate grounding.

Some marinas are not equipped with approved twistlock type receptacles. An adaptor is available from Carver which converts the twistlock shore plug to a three wire grounded household type plug. Use only an approved adaptor when an adaptor is necessary.



WARNING

Modifications to the dual dockside system to allow the utilization of only one shore power cord is NOT RECOMMENDED. Overloading of the distribution system or the shore power cord could result. The use of a "Y" connector to parallel the dockside cords and use only one shore receptacle is NOT RECOMMENDED. This too can lead to overloading of the shoreside wiring.

C. Polarity indicator

If the dockside power source is incorrectly wired and has the polarity reversed, the MAIN circuit breaker will sense the voltage difference between the neutral and ground terminal blocks, this will trip the MAIN breaker. The reversed polarity indicator will remain illuminated even though the breaker has tripped.



CAUTION

Should the breaker trip and the indicator light appear, disconnect the shore power cord immediately. Connect the cord to a properly wired shore receptacle. Notify the marine of the problem.

E - 9 ELECTRICAL SYSTEM MAINTENANCE

Periodically, inspect all wiring for nicks, chaffing, embrittlement, improper support, etc. Examine the shore power cord closely for insulation cracks and corrosion in the electrical devices. Spraying the receptacles and electrical connections with an electrical connection cleaner, such as "LPS" or "CRC," will reduce corrosion and improve electrical continuity.



CAUTION

DO NOT allow corrosion to build on connections. Shorts or ground faults can result.

The entire 120 (220) volt circuitry, especially the shore power cord, should be seasonally tested for proper continuity by an experienced marine electrician. This will help detect any short, open wire, or ground fault. Also, check the polarity indicator system for proper operation.



WARNING

120 (220) volt AC electrical power can be dangerous. DO NOT attempt to service a system unless familiar with, and experienced in, performing such service.

E - 10 ELECTROLYSIS & CORROSION

Two types of electrically induced underwater corrosion occasionally affect boats and the related components. This corrosion appears as surface pitting or deterioration. These two types are as follows:

A. Electrolysis

Electrolysis is the decomposition of chemical compounds by electric current. Electrolysis can be caused by the polarity of the dockside wiring system of the boat being reversed from the power source or surrounding boats, an improperly wired battery installation, other boats that are in close proximity that have electrical power leakages, or any other source close to the boat that has electrical power leakage into the water. Stern drive units are especially vulnerable to electrolysis. However, it can attack a fiberglass hull and inboard underwater gear. Make periodic inspections to determine if electrolysis damage exists. Then determine the source of the problem. If the source cannot be found, it may be necessary to change the place of mooring.

The use of some shore power battery chargers, while the boat is in the water and the battery is connected to the system, can cause electrolysis. Have an experienced marine electrician review any battery charger installation to ensure an electrolysis problem will not develop. Be sure the battery connections are properly made. Improper battery connection, especially the lack of a negative battery bonding cable on dual engine boats, is a common cause of electrolysis.

B. Galvanic Corrosion

Electrical currents produced by two dissimilar metals in an electrolytic solution is galvanic corrosion. Polluted and salt water are much better electrolytic solutions than clean, fresh water. Stern drive manufacturers provide a sacrificial anode, either as a metal trim tab or metal plate affixed to the boat transom. Periodic inspection of this anode for decomposition, and its replacement when it becomes worn, will increase the longevity of stern drive units. Inboard boats, because of the metal used for the underwater gear, are not as affected by galvanic corrosion. However, if dockage is in salt water, at a steel pier, near large metal boats, or anywhere else where substantial metal is in contact with the water, some form of corrosion protection should be provided.

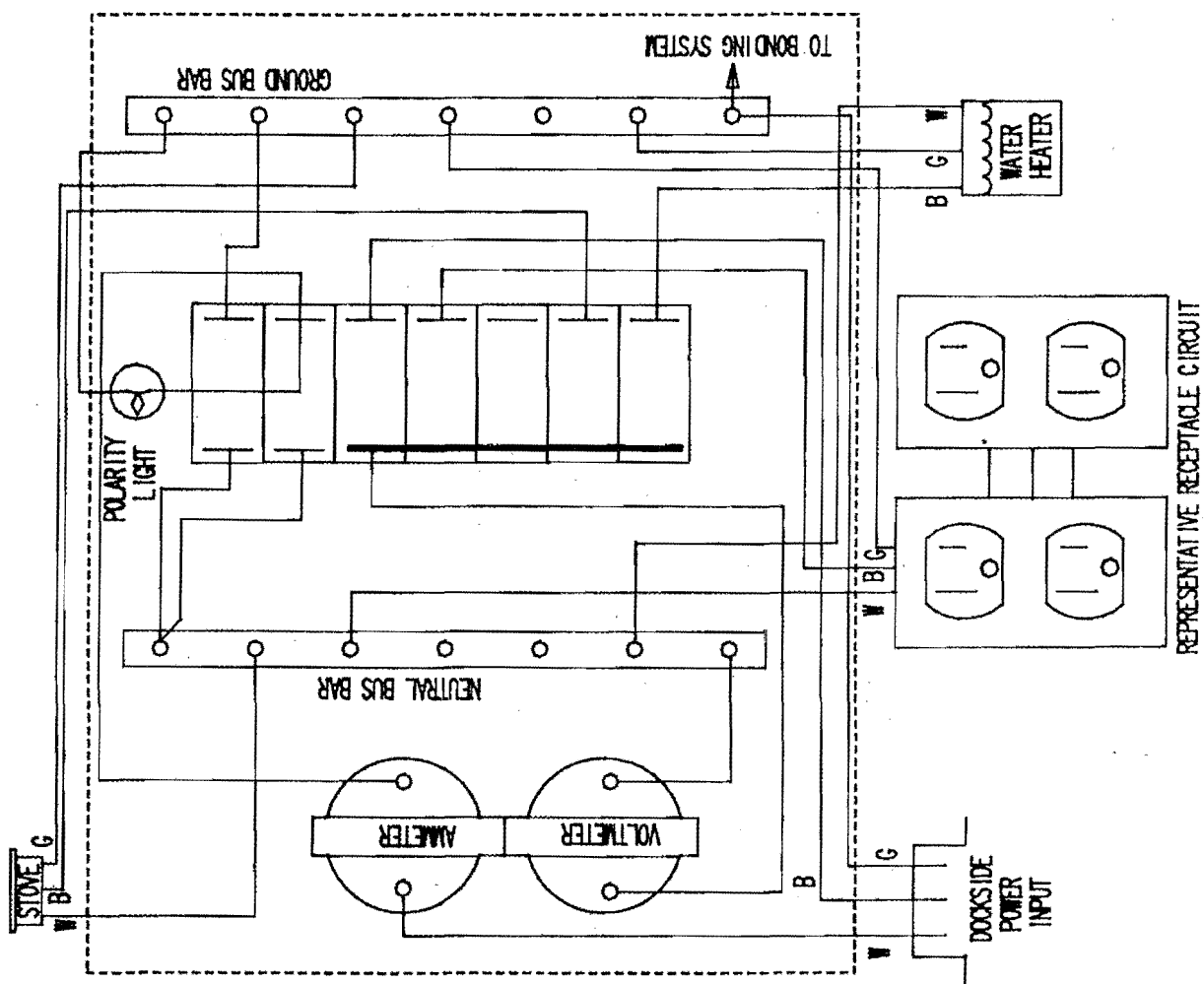


FIGURE E1 • DOCKSIDE WIRING DIAGRAM

CARVER

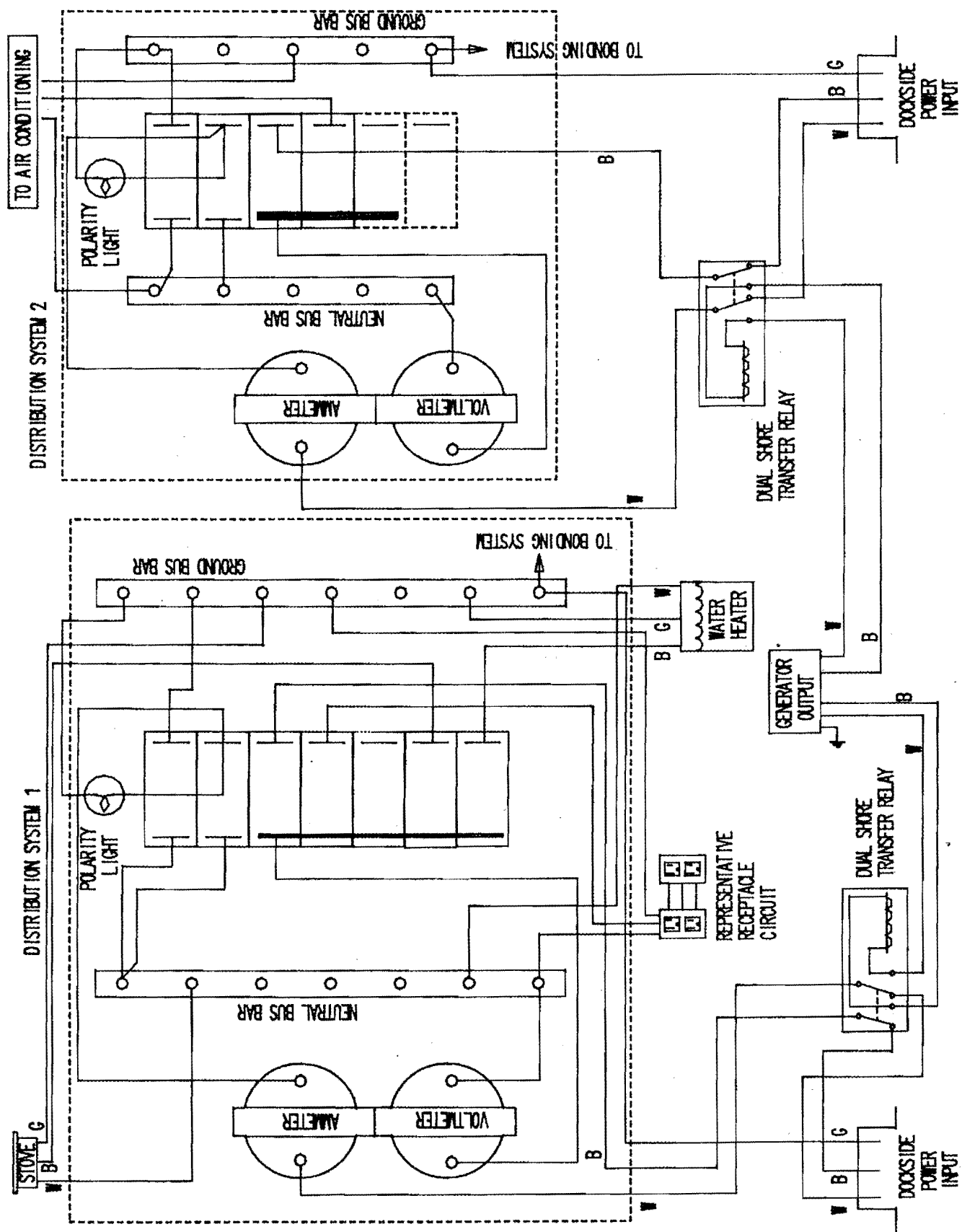


FIGURE E2 • DUAL DOCKSIDE WIRING DIAGRAM

CARVER

12 VOLT WIRE STANDARD

CODE	COLOR	GA	USAGE	ROUTING	SWITCH	FUSE	REMARK
A.....	Red.....	4	Primary Input	Batt. main to fuse	---	30/60 ..	2 wire cab.
A1	Black	10	Ground lead	Upper to lower terminal block	---	---	Single wire
A3	Black	10	Access. gnd-bridge ..	Bridge to elec. center ground	---	---	Single wire
A4	Black	10	Access. gnd-console	Console to elec. center ground	---	---	Single wire
B.....	Brown	14	Aft bilge pump	Fuse to switch to pump	Note 1	7-1/2 ..	2 wire cord
B1	Brown	14	Fwd bilge pump	Fuse to switch to pump	Note 1	7-1/2 ..	2 wire cord
B2	Brown	14	Fwd bilge pump	Batt to fuse to auto switch	---	7-1/2 ..	Single wire
B3	Brown	14	Shower pump	Fuse to switch to pump	SPST	7-1/2 ..	2 wire cord
B4	Brown	14	Aft bilge pump	Batt to fuse to auto switch	---	7-1/2 ..	Single wire
B5	Brown	14	Aft bilge pump	Fuse to switch	---	---	Single wire
B6	Brown	14	Fwd bilge pump	Fuse to switch	---	---	Single wire
B7	Brown	14	Fwd bilge pump	Batt to fuse to auto switch	---	7-1/2 ..	Single wire
B8	Brown	14	Washdown pump ...	Fuse to switch to pump	SPST	7-1/2 ..	2 wire cord
B9	Brown	14	Aft shower pump	Breaker to pump	---	5	2 wire cord
BP1..	Brown	14	Bilge pump light	Pump to light	---	---	Single wire
BP2..	Brown	14	Bilge pump light	Pump to light	---	---	Single wire
BP3..	Brown	14	Bilge pump light	Pump to light	---	---	Single wire
C1	Red	10	Battery charger	Charger to battery #1	---	---	2 wire cord
C2	Red	10	Battery charger	Charger to battery #2	---	---	Single wire
C3	Red	10	Battery charger	Charger to generator battery	---	---	Single wire
CO ..	Orange	14	Carbon mono detec.	Breaker to detector	---	---	2 wire cord
D.....	Brown	10	Pressure water pump	Fuse to pump	---	15	2 wire cord
D2	Brown	14	Cabin heater pump ..	Fuse to thermostat to pump	---	5	2 wire cord
D3	Orange	14	Cabin heater fan	Fuse to thermostat to fan	---	5	2 wire cord
E.....	Or/or & red/blk ..	16	Gen. remote start	Switch to generator	---	---	3 wire cord
F.....	Yellow	14	Bilge blower	Fuse to switch to blower	SPST	10	2 wire cord
F1	Orange	14	Head blower	Fuse to switch to blower	SPST	5	2 wire cord
F2	Yellow	14	Bilge blower	Switch to switch	---	---	Single wire
F3	Yellow	14	Bilge blower	Switch to switch	---	---	Single wire
F4	Orange	14	Defrost	Fuse to switch to blower	SPST	10	2 wire cord
F5	Orange	14	Aft head blower	Breaker to switch to blower	SPST	5	2 wire cord
G1 ..	Purple/blue	16	Port V-drive warning	Ignition to sender to light	---	---	2 wire cord
G2 ..	Purple/blue	16	Stbd V-drive warning	Ignition to sender to light	---	---	2 wire cord
H.....	Orange	10	Trim tabs	Fuse to switch	---	20	Single wire
J.....	Or/or & red/blk ..	16	Windshield wiper	Fuse to switch to wiper	DPDT no off	10	3 wire cord
J1	Orange & red	16	Windshield wiper	Wiper to wiper	---	---	2 wire cord
J2	Orange	16	Windshield wiper	Switch to second wiper	---	---	Single wire
K.....	Orange	10	Horn	Fuse to switch to horn	SPST mom..	20	2 wire cord
K1	Orange	10	Horn	Fuse to bilge switch	SPST mom..	20	2 wire cord
L.....	Pink	16	Fuel indicator	Switch to gauge	Note 2	20	Single wire
L1	Pink	16	Fuel indicator	Switch to #1(port) tank	---	---	2 wire cord
L2	Pink	16	Fuel indicator	Switch to #2 (stbd) tank	---	---	2 wire cord
L4	---	10	Fuel transfer pump ..	Breaker to switch to pump	DPDT	10	2 wire cord
L7	Orange	14	Water monitor	Breaker to monitor	---	---	2 wire cord
M	Orange	14	Fire system alarm	Switch to alarm	---	---	2 wire cord
N1	Dark green	10	Fuel fill ground	Port fuel tank to deck plate	---	---	Single wire

CARVER

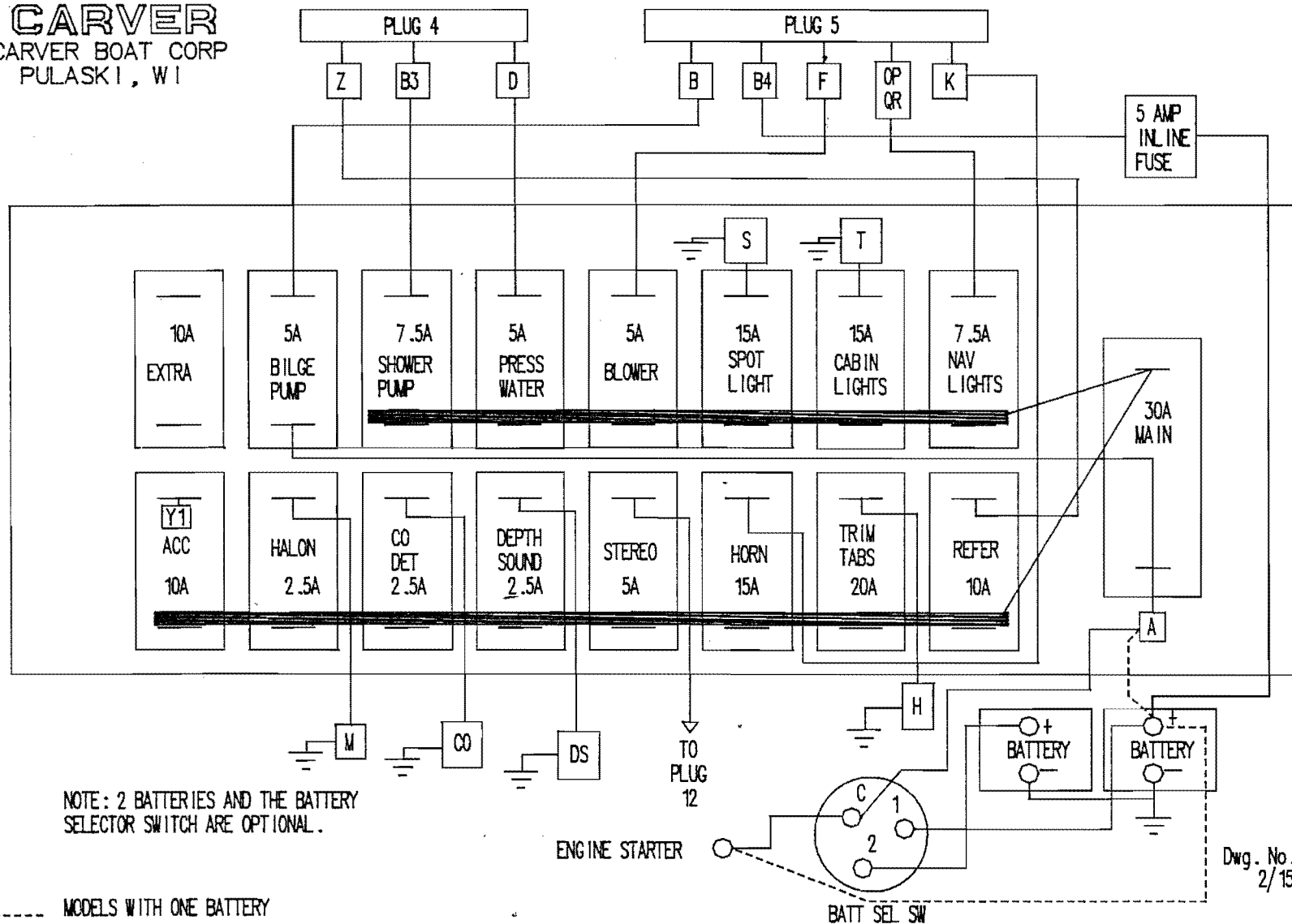
CODE	COLOR	GA	USAGE	ROUTING	SWITCH	FUSE	REMARK
2	Dark green	10	Fuel fill ground	Stbd fuel tank to deck plate	----	----	Single wire
O	Gray	16	Side nav. lights	Fuse to switch to side lights	DPDT	7-1/2	2 wire cord
P	Gray	16	Stern nav. lights	Fuse to switch to stern lights	----	----	2 wire cord
S	Orange	14	Spotlight	Fuse to switch to spotlight	SPST	Note A	2 wire cord
T	Dark blue	14	Interior lights	Fuse to cabin lights	----	20	2 wire cord
T1	Dark blue	14	Interior lights	Fuse to V-berth light	----	----	2 wire cord
T2	Dark blue	14	Interior lights	Fuse to bridge or hardtop	----	----	2 wire cord
T3	Dark blue	14	Int. light/cockpit light	Fuse to light	----	----	2 wire cord
T4	Dark blue	14	Interior lights	Breaker to lights	----	15	2 wire cord
T5	Dark blue	14	Overhead lights	Breaker to switch to lights	SPST	7-1/2	2 wire cord
T6	Dark blue	14	Interior lights	Breaker to lights	----	15	2 wire cord
T7	Dark blue	14	Interior lights	Breaker to lights	----	15	2 wire cord
U	Dark blue	16	Panel lights	Fuse to switch to instruments	SPST	7-1/2	Single wire
V	Purple	16	Voltmeter	Switch to gauge	Note 2	----	Single wire
V1	Purple	16	Voltmeter	Main switch #1 to switch to fuse	----	2-1/2	Single wire
V2	Purple	16	Voltmeter	Main switch to fuse to switch	----	2-1/2	Single wire
W	Orange	16	Stereo	Fuse to stereo	----	7-1/2	2 wire cord
X	Orange	10	Fwd head	Breaker to switch to head	----	20	2 wire cord
X3	Orange	10	Aft head	Breaker to switch to head	----	20	2 wire cord
X5	Brn-Blk	10	Waste pump	Breaker to switch to pump	----	----	2 wire cord
Y	Orange	10	Accessories	Fuse to terminal block	----	10	Single wire
Y1	Orange	10	Accessories	Breaker to bridge terminal block	----	10	2 wire cord
Y2	Orange	10	Accessories	Breaker to console terminal block	----	10	2 wire cord
Z	Orange	10	Refrigerator	Fuse to refrigerator	----	10	2 wire cord
Z1	Orange	10	Refrigerator	Fuse to refrigerator	----	10	2 wire cord

NOTE 1: Some models use a DPDT bilge pump switch. Moving this switch forward or to port will activate the midship pump; if so equipped. Depressing the switch aft or STBD will activate both bilge pumps. Center position is off or automatic. Other models utilize two SPST switches to control the bilge pumps.

NOTE 2: Some models may use a DPDT fuel switch. This may also control the voltmeter battery monitor. Models with only one fuel tank may not utilize a fuel switch; consult the wiring diagram.

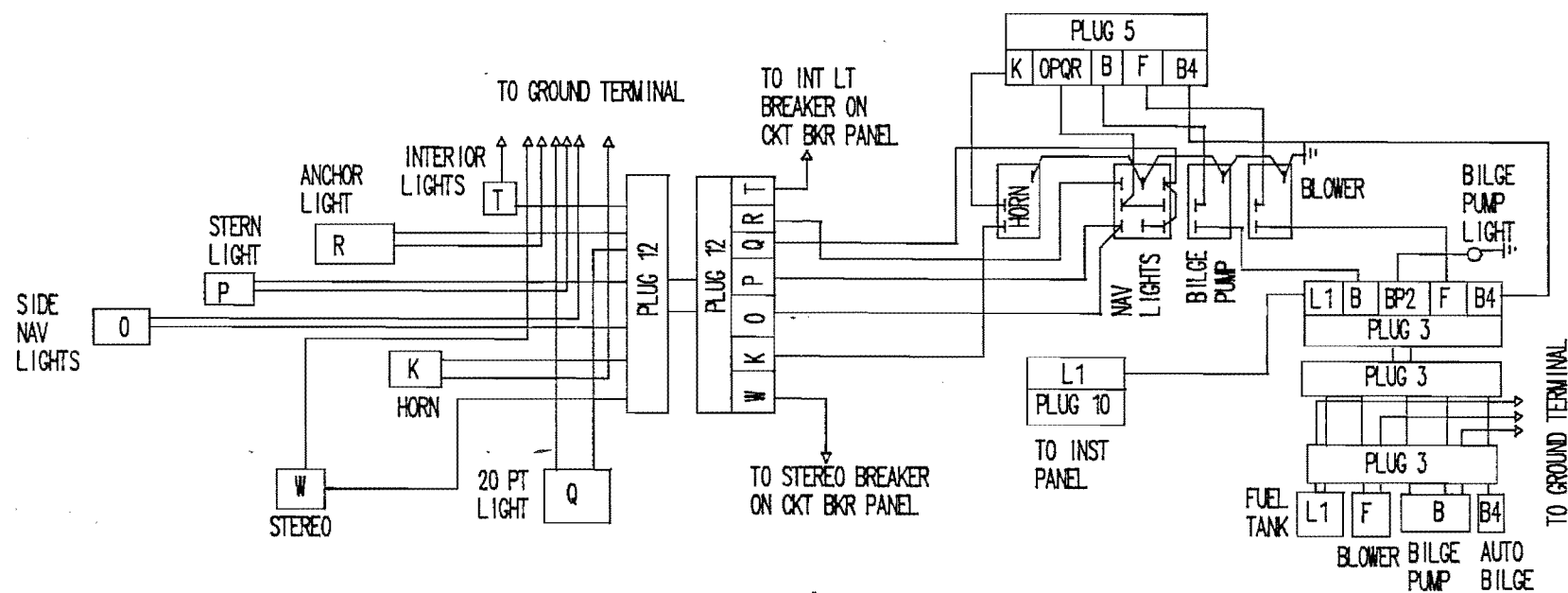
CARVER

CARVER
CARVER BOAT CORP
PULASKI, WI



Dwg. No. D5639A
2/15/88

MODEL 2357 12 VOLT CIRCUIT BREAKER PANEL



Dwg. No. D5639A

MODEL 2357 12 VOLT BRIDGE WIRING DIAGRAM



USING GASOLINE THAT CONTAINS ALCOHOL IS DANGEROUS

The petroleum industry has been reducing the amount of lead in gasoline in an effort to conform to Federal Air Quality Standards. Alcohol is being blended with gasoline as a substitute for lead. While blending alcohol with gasoline increases the octane level of the fuel, it also creates many safety and performance problems for boaters.

-PROBLEMS THAT MAY BE EXPERIENCED WHEN USING BLENDED GASOLINE-

Premature deterioration of fuel system components:

Alcohol will attack rubber fuel hoses, fuel tanks, fuel filters, fuel pumps and rubber gaskets. This deterioration will lead to fuel system leakage.

Phase separation of fuel:

Water that accumulates in the tank through contamination of condensation will be absorbed by the alcohol. This water-heavy alcohol will settle at the bottom of the tank. This phase separation will lead to fuel tank corrosion and possible engine stalling.

Accumulation of alcohol vapors:

Alcohol will permeate all existing types of fuel hose. This will allow flammable alcohol vapors to accumulate within the boat.

The use of alcohol additives in gasoline is becoming more wide-spread. There are no Federal Guidelines that require gasoline pumps to display the types of additives used in the fuel being dispensed.

ASSUME BLENDED GAS IS BEING USED & FOLLOW THESE RECOMMENDATIONS:

Inspect fuel hoses often:

A deteriorated hose containing alcohol blended gasoline will normally be soft and swollen. A deteriorating hose containing no fuel will normally be hard and brittle. In both cases the hose should be replaced.

Ventilate the engine compartment before starting engines:

Operate the engine compartment blower for 5 minutes. Then, prior to starting the engines, check the bilge area for the scent of gasoline fumes; do not start the engines if the odor of gasoline is predominant.

Frequently inspect the fuel system fittings:

Check the fuel tanks, pumps and filters for signs of corrosion. Visually inspect for deteriorating metal fittings at the fuel hose connections.

Fuel leaks due to hoses or fittings on the boat are extremely dangerous. If areas are found within the fuel system that appear questionable, have a qualified marine technician inspect the system. **A thorough fuel system examination should be made by an experienced marine technician at least once a year.**

CARVER

FUEL SYSTEMS

F - 1 GASOLINE FUEL SYSTEMS

Carver fuel systems meet or exceed the requirements, that were in effect at the time of its manufacture, of the U.S. Coast Guard, Boating Industry Association and the American Boat and Yacht Council.

A. System Testing

All gasoline fuel systems have been factory inspected and pressure tested with air in accordance with regulations in effect at the time of manufacture. In addition, each fuel tank must pass rigid tests and inspections performed by the fuel tank manufacturer.

Before taking delivery of your boat, it is important for the selling dealer to make a full inspection of the entire fuel system. An entry on the Carver Pre-Delivery Service Record will attest to the dealer's performance of this service.

B. Fuel Fills

Fuel fill deck plates are located either on the aft deck or side decks and are marked FUEL (for diesel engine models) or GAS. Be sure to utilize the proper type and grade fuel.

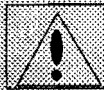


WARNING

DO NOT confuse the deck fuel fill plates with the water or waste deck plates. Each deck plate is clearly labeled to indicate the intended purpose.

C. Fuel Vents

Each fuel tank is vented overboard. While the tank is being filled, the air displaced by the fuel escapes through the vent. When the tank becomes almost full, fuel will eject from the fuel vent.



CAUTION

DO NOT overfill or overflow the tank or allow fuel spills into the hull or bilge.

After fueling, replace the fill cap(s) and wash the areas around the fuel fill plate and below the fuel vent(s). Fuel residue left on the deck and hull sides is dangerous. It will yellow the fiberglass and can damage the striping.

Periodically, remove the small screens from the fuel vent(s) and clean the vent and screen of any dirt, etc. Replace screens securely after cleaning. The screens will help prevent insects and other foreign matter from contaminating the fuel and fuel system.

D. Anti-syphon Valves

Gasoline withdrawal lines are equipped with anti-syphon valves. These valves prevent gasoline from syphoning out of the fuel tank(s) should a line rupture.



WARNING

DO NOT remove the anti-syphon valve(s) from the system. Should the valves become clogged, clean and re-install or replace.

Visually tracing the fuel withdrawal lines will provide the boat owner with a better understanding of the fuel distribution system.

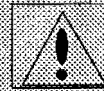
E. Fuel Gauge

The Fuel Gauge indicates the amount of fuel in the fuel tanks. Due to the mechanical nature of the fuel sender, variations in readings during various speeds may occur. This system is merely a relative indication of the available fuel supply and not a calibrated instrument. See section E for instructions regarding fuel gauge operation.

F. Fuel Filters

When supplied by the engine manufacturer, fuel filters are installed on or near the engines. Clean the fuel filters frequently to ensure an adequate supply of clean, dry fuel to the engine(s).

G. Use and Maintenance



DANGER

DO NOT ignore any odor of gasoline. Shut off all engines, electrical and heat generating equipment, and investigate and correct the situation immediately before using any of the aforementioned equipment. Have all passengers put on personal flotation devices and keep fire extinguishers at hand until the described situation is resolved. Avoid the storage or handling of gear near the fuel lines, fittings and tanks.

Periodically inspect all connections for leakage and all hoses for damage or deterioration. Replace as necessary.



CAUTION

The fuel withdrawls are positioned in the fuel tanks to achieve best fuel usage, fuel line routing, etc. At certain speeds and hull trim angles, the fuel supply at the withdrawal tank location can increase or decrease accordingly. **Be extremely careful when attempting to operate the boat on a minimum amount of fuel.** Though some fuel may be in the tank(s), the relative trim angle of the boat may cause the fuel to flow away from the withdrawal(s). The engine(s) would then run out of fuel. Be sure enough fuel is in each tank being used.

H. Optional Fuel Selector Valves

Some models can be ordered with optional Fuel Selector Valves (see the Locator Drawing in Section O for exact location of the Fuel Selector Valves). These valves control fuel flow to the engines. Most often, the Fuel Selector Valves are located in the engine compartment, under the cockpit floor hatches. In the case of dual engine boats, the port valve controls the fuel flow to the port engine. Similarly, the starboard valve controls the flow to the starboard engine. If a generator is installed, it too has a fuel valve provided.

Each Fuel Selector Valve has a label plate. On this plate, PORT and STBD or FORWARD and AFT indicate the tank from which fuel is being drawn. Also, there is an OFF position. The OFF position shuts off fuel flow to the respective engine. Position the valves as desired to use the fuel for best fuel-weight distribution.

I. Fume Detector

A properly installed fume detector or sniffer can be a valuable safety device. See your Carver dealer for recommendations. Remember, a fume detector is a mechanical device, do not rely exclusively on it.

F - 2 FUELING INSTRUCTIONS

1. Avoid fueling at night - except in emergencies.

2. When moored at fueling pier:

- Do not smoke, strike matches, or utilize any switches.
- Stop all engines, motors, fans and devices liable to

produce sparks.

- Put out all lights and galley fires.

- Position the Battery Selector Switch to OFF (if boat is so equipped).

3. Before starting to fuel:

- Ensure that the boat is moored securely.
- Close all ports, windows, doors and hatches.
- Have all passengers exit the boat except the fuel handler.
- Be sure to use the proper type and grade of fuel as recommended by Engine manufacturer.
- To avoid fuel overflow, be aware of how much additional fuel is required.

- If boat is equipped with dual tanks, instruct fuel handler which filler to use and the quantity of additional fuel required for each tank.

4. During fueling:

To guard against possible static spark, keep the fill nozzle in contact with the metal fuel opening at all times.



WARNING

DO NOT overflow the fuel tank or allow fuel to spill into hull or bilges. Monitor the fuel vent located on either on the transom or side(s) of the hull. When the tank is almost full, gas or fuel will spurt out of the air vent.

5. After fueling:

- Replace all fill caps securely.
- Wipe up any spilled fuel.
- Open all ports, windows, doors and hatches.
- Run bilge blower for five minutes before activating equipment.
- Enusre that there is no odor of gasoline in the engine compartment or below decks before starting machinery, turning on lights, or lighting fires.
- Be prepared to cast off moorings as soon as the engine is started.

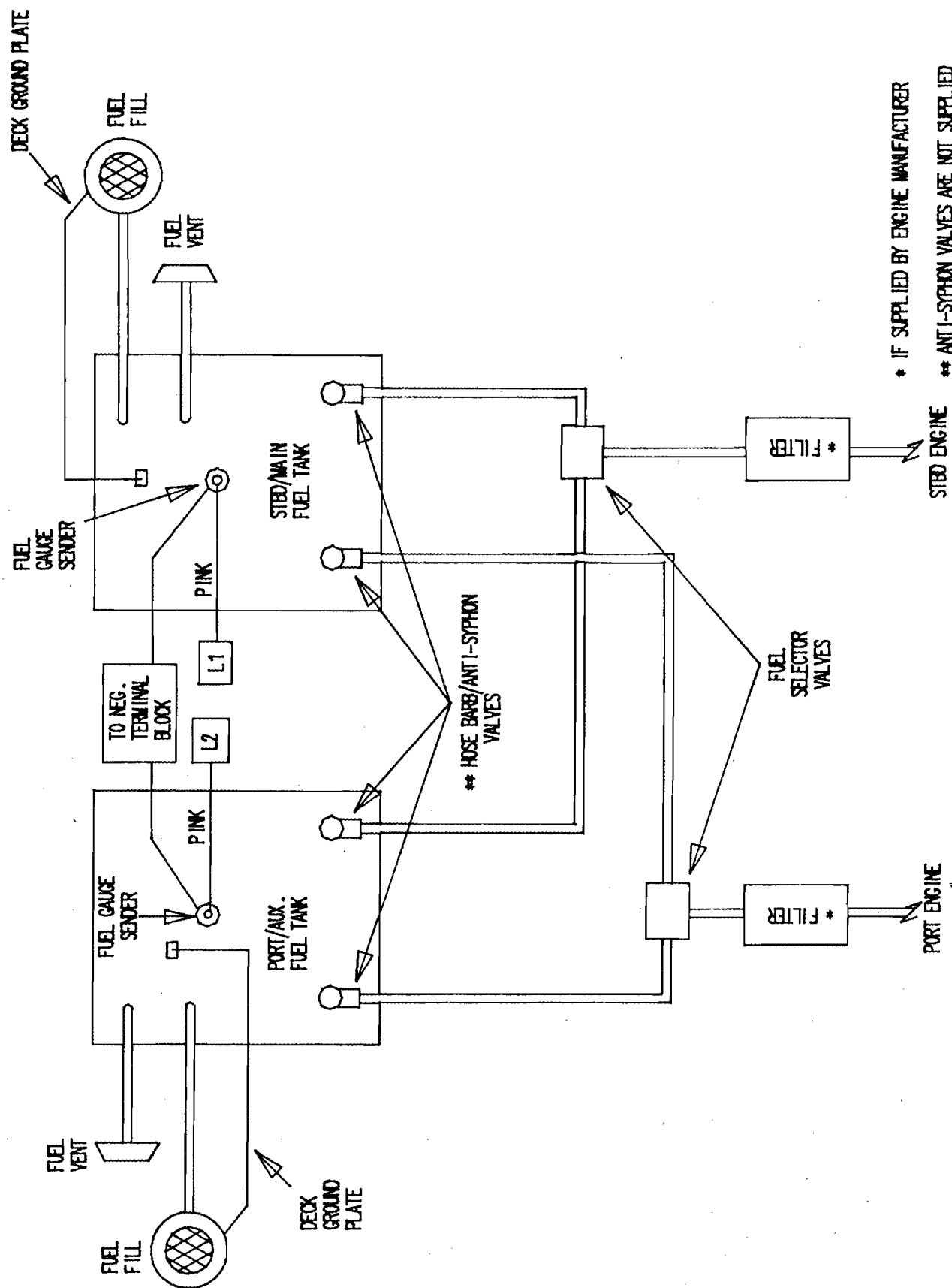


FIGURE F1 TYPICAL FUEL TANK SYSTEM

CARVER

WATER SYSTEMS

G - 1 GENERAL

The fresh water supply system consists of supply tank(s), distribution lines and a distribution pump. A water fill plate is provided for the deck. Some systems have two or more tanks and require slow filling to allow the water to transfer between tanks.



WARNING

DO NOT fill the system with anything other than water. Should the system become contaminated with fuel or other toxic solution, component replacement may be required.

Each water tank is equipped with an overboard vent. Monitor the overboard vent(s) while filling the water tank. When the tank is almost full, water will spurt out of the vent.



CAUTION

DO NOT overfill the water tank(s). Tank damage may result.

The various components used may give the water supply a peculiar taste, especially when new. This condition is normal and can be reduced by a water filter. The taste will completely dissipate in time.

IMPORTANT: Thoroughly flush the system before initial use and at least once each season.

G - 2 PRESSURIZED WATER SYSTEM

This boat has been equipped with a cold, fresh water, pressurized system.

Water Supply Tanks - Location & Capacity

MODEL	CAPACITY	LOCATION
2157	10 gallon	Under aft berth
2357	10 gallon	Under aft berth
2557	25 gallon	Under cabin hatch
2587	20 gallon	Below cockpit hatch
2757	35 gallon	Below mid berth
2767	35 gallon	Below mid berth

NOTE: Water capacity and tank location may vary due to other equipment installed on the boat.

A. Priming the System

After filling the water tanks, partially open all faucets. Position the Battery Selector Switch to the "1", "2" or "ALL" position and place the Pressure Water circuit breaker in the ON position. For pressure water pumps manufactured by Raritan, set the switch on the pump to the AUTO-ON position. After air has been purged from the system and a steady stream of water is coming from each faucet, individually turn off the faucets. Begin with the cold water side of the faucet and continue until all have been shut. As pressure within the system builds, the pump will automatically shut off. See section E for additional data.

B. System Operation

The pressure water system in the boat operates in the same manner as that in a house. Simply turn the valve on the faucet and water will flow. A recently filled system, or one that has not been used for sometime, may need repriming. This is caused by air bubbles accumulating at the pump.

If the boat is to be left unattended for an extended period, rotate the Battery Selector Switch to the OFF position. Also, place the circuit breaker for the Pressure Water Pump in the OFF position.

C. Water Heating Systems (23, 25 & 27 foot models)

A pressurized hot water system can be installed on 23' and 25' models as an option; this system is standard on 27' models. Water lines within the boat are color coded; cold water lines are grey, hot water lines are black.

WATER HEATER CAPACITY AND LOCATION

MODEL	LOCATION	CAPACITY
2357	Under v-berth	6 gallon
2557	Under v-berth	6 gallon
2587	Under cockpit floor	6 gallon
2757	In engine compartment	6 gallon
2767	Under v-berth hatch	6 gallon

NOTE: Water heater capacity and location may vary due to other equipment installed on the boat.

Water will be heated when 120 volt (220 volt on 50 Hertz models) power is applied. Be sure the circuit breaker in the electrical center of the boat is in the ON position.



CAUTION

DO NOT supply electric power to an empty water heater. Damage to the heater will result. Also, be sure the water system has been primed prior to activating the water heater.

The boat may also be equipped with an engine heat exchanger. The heat exchanger is optional on 25' models and standard on 27' models. The heat exchanger allows the heat from the coolant of the propulsion engines to heat the fresh water supply. The water still has to be heated using 120 (220) volt power when the engines are not operating.

D. Shower

If the boat is equipped with a carpet insert in the shower area, it must be removed prior to using the shower. Draw the curtains before using the shower. Damage to the finish and wood can result if surrounding walls and flooring are allowed to become excessively wet. Thoroughly dry these areas after showering.

A shower sump pump is incorporated into the drain system of the shower. Immediately prior to using the shower, **the shower pump must be in an operational state**. To activate the shower sump pump, place the SHOWER Circuit Breaker in the ON position. If the boat is equipped with a Shower Switch in the shower, this switch must be placed in the ON position to start the pump. If no switch is provided in the shower, then the shower sump system is equipped with a float switch in the shower sump. In this case, the shower pump will automatically start as soon as the water in the sump reaches a level that will cause the float on the sump switch to rise. After showering, let the water flow for a period of time to flush the pump of soap residue. See section E for additional information.

To obtain the most consistent mixture of hot and cold water, turn the cold water on full, then mix in hot water until the desired temperature is obtained. Some minor variations in water temperature may occur due to the water pressure pump cycling.

If water flow from the shower head appears to become restricted, it may be due to sediment accumulating at the shower head. If necessary, remove the head and clean the discharge holes with a fine wire.

G - 3 WATER SYSTEM MAINTENANCE

Information supplied with water system components by the equipment manufacturers is provided with this

manual. Refer to this information for additional operation and service details.

Periodically remove and clean the screens in the water tank vent(s). Also, clean the thru-hull vent fitting(s) of any dirt, plastic particles, etc. Always replace the screens after cleaning.



CAUTION

Failure to keep the vent screens & fittings properly cleaned will cause excessive pressure build-up within the tank(s) during filling; this can cause water tank damage.

Periodically remove the filler screens from the faucet discharge spout and remove the accumulation of particles from the screens. If necessary, clean out the holes using a fine wire, etc. A build-up of debris in the faucet filter screens can create enough restrictions to cause the pump to cycle on and off.

Be sure the batteries in the boat are properly charged. Operating the pressure pump from a battery with a low charge will result in pump cycling; this could lead to premature pump failure.

Winter lay-up service procedures should include a thorough draining of the water system. Disconnect all accessible fittings. Be sure the hot water heater, water tank(s), pumps and lines are completely dry. Leave all faucets open. Freezing water can cause severe damage to the components.

Draining the system as mentioned can be very tedious and an incomplete job can result in expensive repairs. The use of non-toxic anti-freeze designed for fresh water systems considerably reduces the work necessary and is a more positive means of winterizing the system. Follow the directions included with the solution.



DANGER

Use only non-toxic anti-freeze solutions. **DO NOT** use ethylene glycol solutions; the type that is used in engine coolant systems. **These are toxic.**

Always winterize the fresh water system prior to winterization of the hull drainage (bilge pump) system.

G - 4 COCKPIT WASHDOWN

The pressure sea water washdown system is available on some Carver models (see the Locator Drawing in

Section O for location of the Cockpit Washdown connection). This system allows utilization of the surrounding sea water for cleaning purposes. A special hose is provided that has two male ends. One end connects to the cockpit or aft deck female fitting. If desired, a nozzle can be connected to the other end. After connecting the hose, activate the pump by means of the Washdown Switch; normally located in the cockpit area.



DANGER

Should a hose rupture, turn the pump off and close the thru-hull valve immediately. Always close the valve when performing maintenance operations on any portion of the Washdown System.

Periodically, clean the in-line filter of any debris that may have accumulated. This filter is located in the bilge area.

A valve is provided on the Washdown thru-hull water intake fitting. Be sure this valve is in the open position when the Washdown System is to be used.



CAUTION

Be sure the pressure sea water washdown system is properly drained or winterized prior to winter layup.

VENTILATION & DRAINAGE

H - 1 ENGINE COMPARTMENT VENTILATION

All Carver boats are equipped with engine compartment ventilation. This system is designed to meet or exceed the requirements (in effect at the time of manufacture) of the U.S. Coast Guard, the Boating Industry Association, and the American Boat and Yacht Council.

A. Gravity Ventilation System

This system includes air intake and exhaust components. The exhaust ducting reaches to the lower bilge area. This provides adequate air movement while underway and during bilge blower operation.

B. Forced Air Ventilation

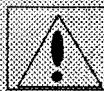
All Carver boats are equipped with an electric bilge blower. The bilge blower provides the ventilation required prior to starting the engines and while at idle. See section E for blower operation instructions.

C. Engine Compartment Ventilation System Maintenance

Periodic inspection and cleaning of the ventilation ducts is necessary to ensure adequate air circulation. A build-up of leaves, twigs, or other debris can severely reduce ventilation. Be sure bilge water does not accumulate to a level that would obstruct the ventilation ducts.

Blower operation can be tested by placing a hand over the vents. DO NOT rely on the sound of the blower. Be sure a substantial amount of air is being exhausted by the bilge blower. Check the bilge blower system often, preferably before each cruise.

Should blower noise and vibration be excessive, loosening the bilge blower mounting screws and then re-tightening evenly usually reduces noise considerably.



DANGER

Before starting the engine(s) or generator, operate the engine compartment bilge blower for 5 minutes. Then check the engine compartment for gasoline vapors. ALWAYS operate the bilge blower while the engines are at idle or the generator is in use. Failure to comply could cause explosion and thereby inflict serious injury.

H - 2 CABIN VENTILATION

Certain cabin side windows on Carver boats are designed to slide open to provide adequate cabin ventilation. Certain cabin side windows have screens provided. Screens for the forward deck hatch are provided with larger model Carver boats.

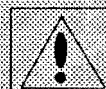


CAUTION

DO NOT close the fore deck hatch with the hatch screen in place. Damage to the screen can result.

In time, the black coloration on certain deck hatch and port hole assemblies may become lighter in color. This is due to the surface oils that were applied to the plastic are being removed due to exposure, this is normal. The deep, rich black color can easily be restored by periodic applications of mineral oil or silicone lubricant.

Some windshields have opening vents. Be sure the windshield adjusters are secured properly, otherwise undue strain can be placed on the vents and hinges.



DANGER

Failure to properly ventilate the boat while the engines or generator are operating may permit carbon monoxide to accumulate inside of the cabin. Refer to Section B for information regarding engine exhaust and carbon monoxide.

H - 3 HULL DRAINAGE SYSTEMS

A. Garboard Drain

A garboard drain is provided near the keel to allow water drainage while the boat is in dry dock. The boat and cradle should be positioned so any bilge water accumulation during dry storage will flow towards the garboard drain. The garboard drain is usually in the engine compartment or near the transom.



CAUTION

Be sure the drain plug is securely in place prior to launching the boat. Upon shipment of the boat, the garboard drain plug is strapped to the engine.

B. Bilge Pumps

Bilge Pumps are provided in the bottom of the hull to remove any water that might accumulate in the hull. The Bilge Pumps are controlled by the Bilge Pump Switches on the Helm Control Panel (see Section E for a detailed description of the Bilge Pump Switches and the Locator Drawing in Section O for exact location of the Bilge Pumps). Some models are equipped with Bilge Pump Indicator Lights that will illuminate whenever the Bilge Pumps are operating.

IMPORTANT: While at rest, any bilge water accumulation will flow forward. Therefore, operate the bilge pump(s) shortly after getting underway and while the boat is at a substantial trim angle. Do Not allow bilge water to accumulate. Damage to the engine or other components may result.

Periodically, clean the bilge pump strainers. DO NOT allow dirt and debris to clog the bilge pump intakes. Check operation of the Bilge Pump Float Switch often to ensure movement of the switch is not restricted by debris, portions of the hull, etc.

IMPORTANT: Wipe up any oil accumulation in the bilge prior to activation of the bilge pump(s). Pumping oil overboard will pollute the water, and is subject to fine.

After winterization of the fresh water systems, be sure the bilge area, bilge pumps and associated hoses are thoroughly dry. Damage to the hull, bilge pumps and other equipment could occur if water is allowed to freeze in the bilge.

C. Bilge Compartment Drainage

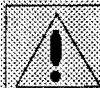
Certain bulkhead areas of Carver boats are sealed in accordance with U.S.C.G. regulations effective at the date of manufacture. For a variety of reasons, water could accumulate behind these bulkheads and would not be removed through normal use of the bilge pump(s). Drain tubes and plugs are provided in some areas to permit drainage of these sealed compartments.

Most models have a drain tube provided in the bulkhead forward of the fuel tank. If the boat is not equipped with a forward bilge pump, the forward bilge area can be drained by removing this plug while the boat is "on plane;" water will then run aft to the bilge area.



CAUTION

Failure to properly drain compartments will reduce boat performance and could cause serious damage.



WARNING

Always replace the drain plugs securely and immediately after all water has been drained from the corresponding compartment. Non-compliance with Federal regulations could otherwise result. Exercise care when removing and reinstalling drain plugs. Always stay clear of operating machinery.

INTERIOR EQUIPMENT

I - 1 HEADS

The various anti-pollution laws presently in effect have necessitated the use and availability of a wide variety of heads. The heads that have been factory installed in Carver boats have been chosen to provide reasonable longevity, and reliable service at a realistic cost.

A. Self-Contained Head (21' model)

This self-contained head has a holding tank built into it. Depressing the foot pedal on the head will allow waste to exit the bowl and enter the holding tank. When the tank gets full, take the boat to a dockside pumping station and have it pumped out; a deck plate fitting, labeled WASTE, is provided for this purpose. See the head manufacturer's instructions, included with this manual, for additional information.

B. Manually-operated Head (23' to 27' models)

The manually-operated head is equipped with a holding tank and a WASTE deck plate fitting. To operate this type of head, open the water valve on the head and then manually operate the pump to discharge the waste into the holding tank. When the tank gets full, take the boat to a dockside pumping station and have it pumped out; a deck plate fitting, labeled WASTE, is provided for this purpose. See the head manufacturer's instructions, included with this manual, for additional information.

NOTE: The sea gate valve for the head must be open whenever the head is to be used. Also, periodically clean the related sea water strainer.

C. Electric Head (Optional on 2767)

This head is the same as the Manually-operated head except that an electric motor is provided to perform the pumping action. A switch labeled HEAD is provided near the head to initiate the flushing action. The head will flush as long as the HEAD switch is manually depressed. Ensure that the water valve on the head is open whenever the head is to be used.

NOTE: The sea gate valve for the head must be open whenever the head is to be used. Also, periodically clean the related sea water strainer.

IMPORTANT: To operate the electric head manually, disconnect the linkage that joins the head pump and the motor.

D. Crown Electric Head (Optional on 27' models)

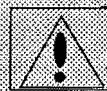
The Crown electric head is activated by depressing the HEAD Switch. The head will continue to flush as long as the HEAD Switch is manually depressed. If the deodorizer container in the Crown head is filled with deodorant, deodorant will be dispersed with the flush water. See the manufacturer's literature for more information.

NOTE: The sea gate valve for the head must be open whenever the head is to be used. Also, periodically clean the related sea water strainer.

F. Auxiliary Holding Tank (Optional on 27' models with manually-operated head)

The auxiliary holding tank option combines a 20 gallon holding tank in addition to the 9 gallon tank provided with the self-contained head. When the holding tank in the base of the head becomes full, transfer the waste to the auxiliary tank using the supplied diaphragm waste pump. This pump is mounted on the starboard side, under the deck, in the engine compartment on the model 2757; on the model 2767, portside, under the V-berth hatch.

IMPORTANT: When a boat is equipped with an optional holding tank, waste that is in the head holding tank will not automatically be removed whenever waste is taken out. The waste that is in the head holding tank will have to be manually pumped into the optional 20 gallon tank to facilitate removal. Always replenish the chemical in the auxiliary holding tank and in the head after pump-out. When using the transfer pump, move the handle slowly and steadily. Trying to speed-up the transfer by rapid pumping can damage the transfer pump.



CAUTION

DONOT try to overfill the waste holding tank. When the tank becomes full, pump it out. Overfilling could lead to tank breakage.

IMPORTANT: Remember to put a fresh supply of chemical in the head after transferring waste to the auxiliary holding tank.

See the information provided by the manufacturer and the instructions on the head for proper operation and maintenance. See section N for information regarding winterization.

I - 2 REFRIGERATORS

Dual voltage refrigerators are standard equipment on most Carver boats. These units will operate on 120 volt (220 volts on 50 Hertz models) AC power while the boat is connected to dockside power. The refrigerator will automatically transfer to 12 volt operation when dockside power is not available.

Though the refrigerator operates on both voltages, it is much more efficient on 120 volt (220 volt on 50 Hertz models) power. Whenever possible, use 120 volt power to initially cool the refrigerator. The refrigerator will cool more slowly, and making ice cubes may be difficult, on a warm day unless the unit is operated first on 120 volts to reduce temperature.

Care should be exercised while operating the refrigerator on 12 volts without the engine running. The refrigerator requires a substantial amount of current. Excessive current draw can severely drain a battery through extended use. Dual batteries and a Battery Selector Switch are recommended when a refrigerator is installed.

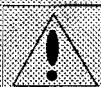
A magnetic catch is used on certain refrigerators. This latch must be properly adjusted to obtain adequate sealing of the door when closed.

IMPORTANT: Review section E and the refrigerator owner's manual prior to installation of a shore power battery charger. Failure to use a proper battery charging system could damage the refrigerator.

I - 3 STOVES

A. Alcohol Stoves

Alcohol stoves are standard equipment. See the Manufacturer's information for additional information.



WARNING

Be careful while lighting and operating the alcohol stove. Flare-up during ignition can result. Use only denatured alcohol of the type and grade recommended. Failure to comply can result in personal injury from burns.

B. Alcohol-Electric Stoves

An alcohol-electric stove is available as an option. This stove combines the features of the alcohol stove with those of a two-burner electric stove. See section I and the manufacturer's manual for additional information.

I - 4 STEREO EQUIPMENT

A cassette stereo with an AM/FM radio is provided on 21', 23' & 25' models and is available as optional equipment on 27' models. The speakers are installed within the interior cabin and exterior bridge-cockpit areas so as to provide good sound quality as well as functional concealment. If the boat is so equipped, information from the stereo manufacturer is provided.

I - 5 AIR CONDITIONING

The 2757 and 2767 are available with air conditioning. The unit operates on 120 volt (220 volt on 50 hertz models) AC power. Therefore, shore power must be connected whenever the air conditioning is to be used. Be sure the appropriate circuit breakers are in the ON position when operation is required..



CAUTION

Most air conditioners utilize surface water as the cooling medium. Prior to using the air conditioning, the boat must be in the water and the seawater gate valve (located in the bilge area) to the air conditioning water intake must be in the open position. Operation without proper cooling water will cause system damage.

IMPORTANT: Clean the sea water strainer often. Also, clean the return air filter screens, located behind the louvered doors and grills, at least once a month.

Air conditioners utilized in Carver boats are equipped with reverse cycle heat. Thus, some heat effect can be derived from the unit. However, the amount of heat that can be obtained is limited by the ambient temperature of the water.

EXTERIOR & SAFETY EQUIPMENT

J-1 SPOTLIGHT

A properly operating spotlight is essential for safe cruising at night. Carver offers electrically controlled spotlights as optional equipment. The spotlights use electric motors and helm switch controls to direct the spotlight beam. The spotlights also can be controlled from both stations on a dual station boat. See Section E and the spotlight manufacturer's literature for additional information.

Shipping height restrictions on some models require the spotlight, if ordered, be installed by your Carver dealer. The installation would then be made during pre-delivery service.

J-2 COMPASS

A compass is a valuable piece of equipment when operating offshore, in unfamiliar waters, or in adverse weather conditions. The safety of those aboard the boat could at some time depend upon the compass and your navigational skills.

After all personal equipment is installed, including all electronics (radio, depth sounder, etc.), the compass must be properly calibrated. Do Not rely on the compass readings until initial adjustments (compensation) have been performed. If the boat has a factory installed compass, the manufacturer's instructions on compass adjustments are provided. Most areas have local companies that specialize in compass adjustment. If unsure of the proper compensation techniques, consider having the adjustment done professionally. Confidence must exist in the compass.

IMPORTANT: During use, keep all extraneous metal objects away from the compass. The close proximity of metal objects (e.g., beverage cans) can cause compass deviation.

J-3 ENGINE HOUR METER

The optional engine hour meter provides a numeric readout of elapsed engine operating time. This readout is important for determining scheduled maintenance intervals, ship's log data, cruise information, etc.

NOTE: The hour meter is connected to the Ignition Switch. Be sure the Ignition Switch is in the OFF position when the engine is not operating or the hour meter will record additional time.

J-4 DEPTH SOUNDERS

A. 21, 23 & 25 Foot Models

The 21, 23 and 25 foot models are supplied with a Depth Sounder as standard equipment. See the manufacturer's manual for information regarding the depth sounder.

B. 27 Foot Models

Carver does not offer a Depth Sounder for these models. If a Depth Sounder is to be installed, Section L will provide the proper method for installing a thru-hull transducer. This transducer should be located in an area of the hull that will not be affected by water turbulence while underway. Because this area varies slightly from model to model, discuss the location of the transducer with a Carver dealer before installation.

J-5 TRIM TABS

Electric/hydraulic trim tabs help provide maximum control of the hull in all water and load conditions. If used properly, trim tabs can greatly improve performance and efficiency. The proper use of electric/hydraulic trim tabs requires a basic understanding of trim tab operation and some practice in calm water.

A. Operation

The trim tab control has 4 buttons, the top two are labeled "Bow Down" and the bottom two are labeled "Bow Up."

Depressing the upper starboard button will cause the trim plane on the port side to move downward. This would cause the starboard bow to move downward when the boat is planing.

Depressing the upper port button will cause the starboard trim plane to move downward. This would cause the port bow to move downward when the boat is planing.

Depressing the lower starboard button will cause the port trim plane to move upward. This would cause the starboard bow to rise when the boat is planing.

Depressing the lower port button will cause the starboard trim plane to move upward. This would cause the port bow to rise when the boat is planing.

IMPORTANT: Optimum efficiency is obtained when operating at a 4 to 5 degree trim angle. Utilizing too much "Bow Down" trim tab can reduce operating efficiency and cause substantial steering and handling difficulties. Be extremely careful when running in a following sea. The effect of trim planes is amplified under such conditions. Steering and handling difficulties can result from improper trim tab usage, especially in a following sea. If unsure of proper trim tab positioning, raise the trim tabs to the full-up position.

B. Correct Usage

Before leaving the dock and utilizing the trim tabs, ensure the trim planes are in the full up position. Depress both lower buttons (bow up) and hold (for approximately 10 seconds) until the planes are full up.

Always establish your intended heading and attain desired cruising speed before trying to adjust running attitude (using the trim planes). After stabilization of speed and direction, depress whichever upper (bow down) button will achieve a level side to side running attitude. If the button is depressed too long and thus overcompensated, Do Not try to correct the situation by depressing the other "Bow Down" button. Instead, raise the plane slightly by depressing the appropriate "Bow Up" button.

IMPORTANT: After depressing a trim tab button, always wait and allow time for the change in trim plane position to take effect. Do Not continue to depress the button while awaiting trim plane reaction. By the time the effect is noted, the trim plane will move too far and thus overcompensate.

When running at an engine speed that will result in the boat falling off plane or will cause the boat to plane inefficiently, lowering both tabs slightly (bow down buttons) will improve the running angle and improve operating efficiency.

When running in a displacement (very slow speed) mode, better efficiency will be obtained with the trim planes in the full-up position.

IMPORTANT: When running at high engine speeds, be sure the trim planes are in the full up position. Trim plane action should be only enough to compensate for any listing. Trim plane adjustments at high speeds are extremely critical. Be prepared to slow down should handling difficulties arise.

Check the fluid level of the trim tab reservoir often. Always keep the fluid level between the designated marks on the trim tab pump-reservoir.

J-6 RAILS & DECK HARDWARE

Safety rails have been installed to provide security for the passengers. Many Carver models have gates, chains, or safety lines to provide additional security for persons in the cockpit or bridge. These safety chains or gates must be securely fastened whenever the boat is underway. The transom door in the cockpit, if so equipped, must always be kept closed and latched whenever the vessel is in motion. Limiting passenger movement while underway is also recommended. All those on board should be safely seated whenever possible. Additional care must be taken when in rough seas or foul weather. Access to the foredeck should be through the foredeck hatch when running in adverse conditions.

The rail system and hardware fittings have been selected and installed to perform specific functions. Fenders or mooring lines should not be secured to the rails or stanchions. Be certain that a clear lead exists when running dock lines or an anchor line. A line inadvertently threaded around a stanchion or over the rail could cause damage.

The majority of the hardware installed is made of stainless steel. Other items such as safety chains are made from chrome plated brass. Regardless of the type of hardware used, periodic maintenance is necessary.

Cleaning and polishing the hardware with a non-abrasive cleaner will help keep the original shine and beauty. Stainless steel hardware, while quite durable, can become superficially rusted. This can be controlled by cleaning the fittings and applying a coat of wax. Any future rusting can be easily removed by polishing and re-waxing.

IMPORTANT: All fittings must be periodically inspected for loosening, wear, and damage. Any problems should be corrected immediately!

The cleats that have been installed are specifically designed and are intended to be used as mooring cleats. Their purpose is for securing the vessel to a dock, pier, mooring, or anchor.

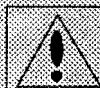


WARNING

Carver Boats are not equipped with any hardware designed for towing purposes. The mooring cleats that are installed on the boat are not to be used for towing another vessel or having the boat towed. Refer to Section O for additional precautions regarding ground-ing and towing.

J-7 SWIM PLATFORMS

Carver offers a fiberglass swim platform with ladder for all models. The transom of the boat must be properly reinforced for the swim platform installation. See a Carver dealer for additional information.



DANGER

Do Not use the boarding ladder or swim platform while the engines are operating or the boat is in motion.

J-8 BOW PULPITS

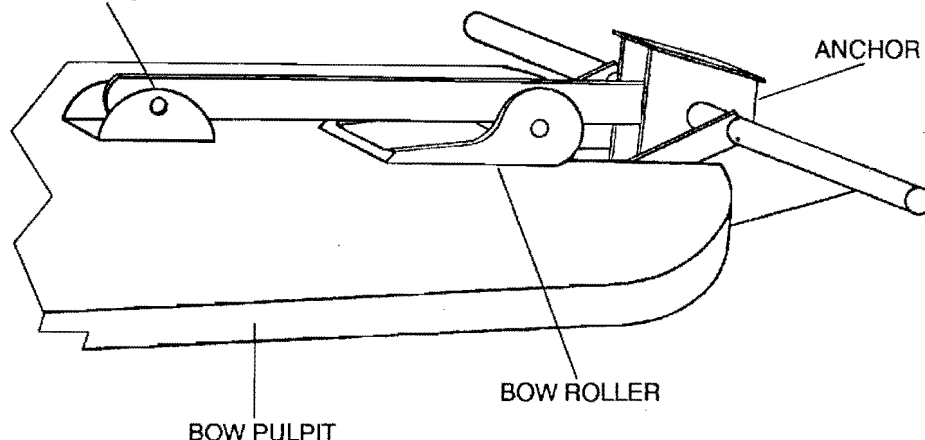


WARNING

Never stand on or try to utilize the bow pulpit in any way while the boat is underway.

The Carver bow pulpit is designed for standing on while anchoring. Most "Danforth" style anchors can be stored

BRACKET & PIN



on the platform. An anchor retainer bracket and clevis are included to secure the anchor while not in use. See Figure J1 for bow pulpit and anchor mounting information.

J-9 FIRE EXTINGUISHER SYSTEM

A self-contained, Halon fire extinguisher system is standard equipment on 27' models and is available as an option on 21'thru 25' models. The equipment utilized has been so chosen, and located, to provide sufficient volume and coverage of the entire engine compartment. While the Halon system ensures excellent overall bilge fire protection, it does not eliminate the U.S.C.G. requirement for hand-held fire extinguishers.

Carver dealers can provide additional information regarding the Halon Fire Extinguisher Systems. Also, boats equipped with Halon Fire Extinguishers may be eligible for insurance discounts.

If the boat had a Halon Fire Extinguisher System factory installed, the information provided by the system manufacturer is included.

The U-bracket is to be centered on the pulpit and situated in such a position on the pulpit so as to accommodate the anchor.

Ideally, the bracket should be located so that the spring lock pin can be slipped through the shank eye when the anchor is drawn up on the pulpit and is lying flat.

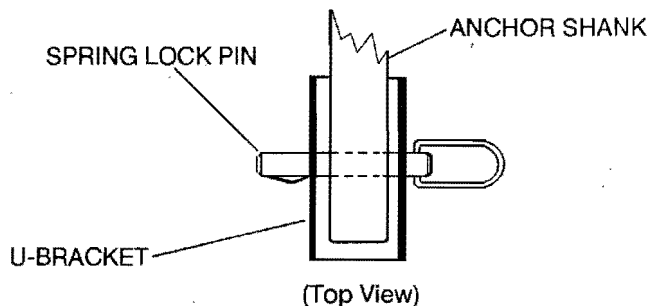


FIGURE J1 • BOW PULPIT U-BRACKET & SPRING LOCK PIN

CARVER

SEATING & WEATHER COVERS

K - 1 V-BERTH FILLER CUSHIONS

Whenever applicable, Carver provides a drop-in cushion for the v-berth area as standard equipment. This will provide additional berth area and still permit easy access to surrounding compartments and area when the cushion is not in place.



CAUTION

Before use, be sure the v-berth filler cushion is securely installed. Be sure any retainer legs or locking mechanisms provided are positioned correctly.

K - 2 DINETTE BERTHS

The dinette area of most models can be converted to a berth through the use of the removable table leg pedestal. Lift the table top from the table leg(s). The table leg pedestal (tube) can then be lifted from the mounting base and the table top set onto the support cleats. The dinette filler cushion should be set in place securely.

K - 3 CONVERTIBLE STERN SEATS

A convertible aft deck lounge is available on some models. This item provides additional seating in the cockpit and the capabilities of a sun lounge or additional berth with the appropriate weather covers.

The Montego and Santego series includes a lounge in the aft area of the cockpit. This seat is removable when additional space is needed. Slide the two barrel bolts that are under the forward outer edges of the seat to the open position to lift and remove the seat.



CAUTION

BE CERTAIN the aft deck lounge seat in the boat is properly secured prior to being used.

K - 4 UPHOLSTERY MAINTENANCE

A. Exterior Upholstery

The vinyl upholstery material used on the exterior upholstery can be easily cleaned by using mild detergent and water. Be sure to thoroughly rinse the seats

after washing to remove all soap film. Periodic spraying of the seats with Lysol Spray Disinfectant will help protect from mildew. Periodic applications of a vinyl protection solution such as Armorall will help keep the vinyl soft and rich looking.

Carver offers a variety of optional weather covers for protection of the boat and associated equipment. Continued exposure of the exterior upholstery can damage the upholstery and seating. The seating can become thoroughly saturated with water if not adequately protected.

IMPORTANT: The appearance and future usefulness of the exterior upholstery will be affected by water saturation. Protect these items from moisture.

B. Interior Upholstery

The fabric upholstery should be treated the same as home fabric upholstery. Periodic vacuuming and shampooing will keep the upholstery clean and odor free. Spraying the upholstery with Lysol Spray Disinfectant will help retard mildew.

C. Upholstery Replacement

Should the upholstery become severely soiled, torn, or in some manner damaged, replacement upholstery cushions and certain jackets are available. However, the original vinyl or fabric patterns may not be available. Replacement upholstery can be obtained by providing the cushion description, boat serial number, upholstery color, and whether a jacket or complete cushion is needed. Contact a Carver dealer or the Carver Customer Service Department.

D. Exterior Carpets

These are removable exterior grade carpeting which may be washed with mild laundry soaps, dried and re-installed periodically. It is not recommended they be dried in an automatic drying machine.

E. Interior Carpets

Carver utilizes interior carpeting by Armstrong called Anso IV nylon. It is very durable and resistant to water and soiling. Vacuuming and occasional rug shampooing are recommended for extended life and appearance.

K - 5 DRAPERIES & WINDOW COVERS

After a season or more of usage or exposure, you may wish to remove the draperies. Dry cleaning is recommended. Many draperies can be easily removed after removing the screw from the end of the curtain track. Others, such as the cabin side window curtains, can be removed after following these steps:

- a. Locate a point on the curtain track aft of the normal travel of forward cabin side curtains and forward of the normal travel of the aft cabin side curtains.
- b. Drill a hole approximately 3/16" diameter upward through the curtain track.
- c. Pull the curtain tabs down through the hole drilled in b.
- d. To re-install the draperies, insert the curtain tabs back into the hole drilled and slide the curtain in the direction desired.
- e. After re-installation of the curtains in step d, insert a self-tapping screw in the hole to keep the curtains from accidentally falling out.

K - 6 CARVER WEATHER COVERS

Protective weather covers for the bridge and/or cockpit areas of your boat are available Carver options. Most models also have side curtains available. See your Carver dealer for additional information on weather covers.

Bimini tops are designed and intended to provide coverage of the bridge seating areas from the sun. These tops are not a weather cover and will be damaged by accumulation of rain water. After use, the bimini top should be rolled into the boot and secured. While these tops are intended to provide ample weather protection for the bridge, the tops completely weather-tight like a winter storage cover, for example. In addition, certain bridge covers necessarily contain slots to accommodate bimini support stanchions. To avoid getting them wet, it is recommended that all exterior bridge seat cushions be removed and stored when the bridge cover is installed.

The model 2767 is available with a Bimini Top that has full side enclosure curtains. This top is structurally designed to remain erected during foul weather. The canvas top and enclosure on the Montego models may remain erected as protection from the elements as well.

The white vinyl material used in Carvers weather covers is treated to resist mildew and is easily kept clean by

washing with soap and water. Additional mildew protection can be obtained by spraying the underside of the weather covers with Lysol Spray Disinfectant. Mildew is caused by moisture accumulation in areas with limited ventilation. Should mildew begin, thoroughly wash the cover with soap and water and allow it to dry in the sun. This can cause the cover to shrink slightly, so re-installation may be slightly more difficult. Spray the top with Lysol after re-installation.

Carver weather covers which are other than white in color are made of "Sunbrella" (100% acrylic) material. This can be cleaned by first soaking it for about 20 minutes in:

1/2 cup Clorox
1/2 cup Ivory Flakes
to each gallon of luke warm water

then, wash the Sunbrella fabric in an automatic washer using:

2 cups Clorox
1 cup Ivory Flakes
use COLD water and the COLD cycle.

Line dry the fabric.

IMPORTANT: DO NOT use Hot Water. DO NOT dry in an automatic dryer. DO NOT dry clean or steam press.

Leakage after cleaning may be the result of insufficient rinsing. Re-rinse. If leakage continues, apply a coat of silicone air drying water repellent, such as Scotchguard on a sunny day. Scotchguard is a product distributed by the 3M company and is available at most department stores, similar air drying water repellent products may work as well.

During the manufacture of the weather covers, the smallest possible needle and high quality dacron/cotton thread is used in the stitching. Seepage through the seams of vinyl weather covers may occur. Carver provides a can of vinyl daub with each boat equipped with a convertible or camper top. This is liquid vinyl which can be applied to seal the seams of a top. Follow the application directions on the can.

During a hard rain, you may notice a light mist permeating through a weather cover made of "Sunbrella" acrylic material. This is normal. Unlike vinyl weather covers, it is not necessary to treat the seams of a weather cover made of "Sunbrella" acrylic material.

IMPORTANT: NEVER fold or store a wet weather cover. This can lead to mildew or shrinkage. Roll rather

than fold the enclosure curtains. Sharp folds increase the chance of cracking the clear vinyl.

High winds encountered during trailering your boat can severely damage the weather cloth. If an extended trip at highway speeds is planned, the top and other weather covers should be in the down position or removed entirely. This will prevent damage, and loss.

IMPORTANT: DO NOT use the weather covers during outdoor winter storage. The weight of the snow or heavy rain can cause severe damage to the material or top structure.

Many styles of canvas covers use "Pull-the-Dot" snap fasteners. These snaps are fastened by applying pressure on the edge of the snap that is marked with a dot. Pulling the edge of the canvas near this same dot will unfasten the snaps.

K - 7 WINTER STORAGE COVERS

The boat must be properly protected during winter dry dock storage. A winter storage cover is advisable. See a Carver dealer for information on the availability of winter storage covers.

Ensure that proper supporting framework keeps the weight of the snow and rain from accumulating on the storage cover. Proper ventilation must also be provided or dry rot and mildew can result. See Section N for additional winter storage information.

FIBERGLASS HULL & COMPONENTS

L-1 GENERAL

Carver boats are designed using the sound engineering and mathematical principles of hydrostatics, structure, and strength of materials. The structural integrity and performance characteristics most often desired in each model style can thus be optimized. The exact fiberglass laminate schedule and construction techniques of each part is determined in accordance with the strength and rigidity required.

Carver boats utilize a modified or deep V-hull construction. The sharp V of the hull at the stern will cut the water cleanly to soften the ride in rough water. The strakes in the hull are designed to provide additional lift for easier planing, more stability and to help soften the ride. Carver Boat Corporation believes the Carver hull designs optimize performance and riding qualities, and permit the most spacious interior layouts in today's cruiser market.

L-2 FIBERGLASS COMPONENT CONSTRUCTION

The fiberglass components of Carver boats are of the finest quality materials, workmanship and construction techniques available. This ensures the structural uniformity and strength to provide years of boating enjoyment with minimal maintenance.

The construction of a Carver hull begins with the application of gel coat to the mold. The gel coat is approximately 25 mil thick. A coat of chopped fiberglass is then sprayed into the hull and hand rolled until it is securely affixed to the gel coat. The coating will prevent the coarser texture of the later applied fiberglass laminates from showing through and spoiling the appearance of the hull.

A number of fiberglass layers and woven roving are applied to the above laminate. Each layer is hand layed and hand rolled. The keel and chine areas have fiberglass woven roving overlapped in these areas to provide additional strength. Additional laminations to the strake areas add rigidity to the assembly and considerably reduces the possibility of fiberglass voids.

Some models utilize encapsulated end-grain balsa core or coremat laminates to achieve additional rigidity. Others, utilize additional laminations of woven roving to maintain strength and rigidity.

The hull support stringers are located using special tools, and are fiberglassed into place. This ensures a

strong, rigid, hull permanently formed into a solid assembly, free of distortions.

Fiberglass cockpit liners, decks, cabins, and command bridges are constructed similar to the hull. Balsa core or coremat laminations are utilized when necessary.

Besides a thorough visual inspection of each fiberglass component, samples are tested using special equipment. By these procedures Carver ensures proper composition. Special equipment is also used to monitor laminate thickness.

L-3 ADDITIONAL EQUIPMENT INSTALLATION

Many boats are used for specific purposes or under conditions which require the addition of special equipment to the hull, decks or cabin areas. Special care must be taken during the installation of any equipment to a fiberglass component. Silicone "marine" seal or other similar bedding compounds should be used to prevent water leakage around any installed item.

IMPORTANT: Do Not install any item onto or through the hull without adequately sealing the hull area penetrated by the installed item or related fastenings. Improper installations could cause leakage or allow water absorption into the balsa core and thus cause serious hull damage.

Any equipment which will be subjected to cyclic loading or directional forces should be through-bolted to a fiberglass component. A butt block or backing plate should be used to strengthen any area onto which an item will be mounted.

IMPORTANT: Always pre-drill fastening holes with a proper size bit. Pre-drilling will help prevent the fiberglass from splintering and thus causing unsightly damage.

L-4 FIBERGLASS CARE

Though fiberglass is weather resistant and does not require the considerable amount of labor that a wood hull does, some care is necessary. Periodic washing of all fiberglass areas will maintain the beauty and original shine. Caution should be exercised when selecting a cleaning agent. Certain cleaning agents are too caustic and can cause permanent damage or discoloration to the gel coat. Do not use acetone or strong alkaline based detergents, nor cleaners with a "gritty" and abrasive texture. Avoid products which contain so-

dium-phosphate. Common examples of these types of household cleaning agents are: Tide, Oxydol, Clorox, Janitor-in-a-drum, Fantastic, etc. Always read the label before using an agent. Some household detergents are gentle enough to be safely used, such as Ivory or Dawn dishwashing liquid. There are also several products available which are specifically designed to clean fiberglass exterior finishes. Many companies like Johnson & Johnson, Turtle Wax, etc. manufacture cleaning fluids mild enough to clean without stripping the wax.

IMPORTANT: Treading on a soiled fiberglass surface can severely scratch and mar the finish. Keep the fiberglass as clean as possible.



WARNING

Waxing decks, cockpit floors or other areas on which one walks is not recommended. Waxing will produce a very slippery surface, especially when wet. Wax may also build-up in the non-skid surfaces. Be sure all persons wear deck shoes while aboard the boat. Footing will be improved and feet will be protected from accidental cuts and bruises.

Waxing of the fiberglass will retard the fading process and keep the boat looking like new longer. A darkening or discoloration of the non-skid surfaces can sometimes occur as a result of wax build-up. This can either be from continuous applications of wax, or from the mold release wax left from the manufacturing process. Exposure to the sun and elements can turn the wax darker, or occasionally can cause it to become flakey or a powder. This can be rectified by applying small amounts lacquer thinner (not enamel) to the area and scrubbing it gently with a small medium-bristled brush, such as a toothbrush. Do Not attempt to use a wire brush or sandpaper as this will remove the non-skid gel.

IMPORTANT: Do Not wash or allow decals or hull striping to come into contact with acetone or similar cleaning agents. Decal or tape damage will result.



CAUTION

Striking docks, other boats, submerged objects could create a very hazardous situation or severely damage the fiberglass. In the event an object is struck below or near the waterline, proceed directly and cautiously to the nearest service facility and remove the boat from the water. Closely inspect the hull for damage. If the outer fiberglass laminate was penetrated and the balsa core exposed to the water, repairs must be made prior to re-launch. Continued exposure of the balsa core to water could result in serious hull damage.

IMPORTANT: A trailer, or storage cradle designed for a larger or smaller boat will not provide proper support for the hull. This could lead to hull deformation and thus serious performance deficiencies.

Due to the design complexities, Carver does not recommend trailers or storage cradles be home-made. The boat is a valuable piece of equipment. Do not risk permanent damage to the hull structure in an attempt to save the cost of an adequate support.

L-5 HULL SUPPORT

Proper support of the hull while it is out of the water is imperative. Improper support can lead to serious and permanent hull deformation.

NOTE: Always lift the hull using proper lifting straps, at the designated "sling" locations. The only exception to using the designated "sling" marker locations, is when utilizing a lifting machine which has a single lift cable. On certain models, the center of gravity may be aft of mid-ship, due to the engine/drive installation. To compensate for this, some trial-and-error replacement of the lifting straps may be required to lift the boat "level" with the surface. Always use a spreader bar or other lifting equipment that will prevent excessive force from being applied at the gunwale area.



CAUTION

When attempting to raise the hull, never allow one end of the boat to rise first, while letting the opposite rest momentarily on the underwater gear. Serious damage to these components could result. Also, do not place lifting straps below underwater gear, but only against the hull surface.

Carver Boat Corporation will provide a shipping-storage cradle as standard equipment unless the option to "Delete Cradle" is elected. In many instances, Carver may have to ship the cradle disassembled.

Should you wish to trailer your Carver boat, be sure the trailer is designed to adequately support and carry the boat. Trailer manufacturers such as E-Z Loader, Moody Manufacturing, Rite-On Trailers, and others have units which are specially designed to properly support, and carry. See a Carver dealer for recommendations.

L-6 FIBERGLASS REPAIRS

Fiberglass is one of the durable, strong, and forgiving construction materials afloat. Due to the resilient characteristics, damage from striking an object or dock

is minimal. Occasionally, blisters, crazing, scratches, or damage to the fiberglass can occur. Crazing is the appearance of hair-line cracks in the gel coat. The occurrence of blisters, especially below the water-line on the hull, is an unfortunate but common difficulty encountered on fiberglass structures. The appearance of fiberglass crazing or blisters is not a sign of deterioration. These problems, when present, usually occur in the gel coat finish or the outer "skin coat" fiberglass laminations. Though blisters are basically "cosmetic," repair as soon as possible after discovery when below the water-line. Allowing blisters to go unresolved for an extended period can lead to more severe blistering or other fiberglass lamination difficulties.

Blisters can range in size from that of a pin-head to that of a silver dollar and are usually dome-like. Usually blisters will be most apparent immediately after lifting the boat from the water. The blisters may decrease in visual size or "flatten-out" as the hull dries out. Mark blister location upon discovery. When broken open, fiberglass blisters will usually be shallow in depth and will often have water or a clear, foul smelling liquid inside.

Cosmetic surface damage can be repaired as follows:

1. Sand the surrounding area with medium or fine grit sandpaper. Clean all marine growth, dirt, anti-fouling paint, etc. from the immediate area. Do Not excessively scratch or gouge the surrounding area.
2. Use a hard, pointed tool to open the blister or gel crack. Take care not to damage the surrounding gel coat.
3. Sand the blister, crack or gouge so the edges are smooth and will allow proper "feathering" of the area.
4. Clean the area thoroughly. Make sure the area is dry before proceeding.

NOTE: Be sure the structure and the ambient temperature are above 60 degrees F (15 degrees C) and the relative humidity below 70% immediately before, during, and after the repair.

5. If the nick or gouge is deep and penetrates through the gel coat, fill the area with fiberglass patching paste. Follow the directions on the can when mixing the paste with the catalyst.

6. After the gouge is filled and has dried, sand the patched area. Begin by using medium-fine grade sandpaper. Progressively use finer grade sandpaper until the surface is very smooth. If necessary, add additional filler and then sand the surface again.

7. Apply two or three light coats of matching fiberglass gel coat to the repaired area. Enough gel coat should be used so that the entire area is covered.

The gel coat used on Carver boats is available from the Carver Boat Corporation or from a Carver dealer. Due to color variations and fading, matching the color of the gel coat may be difficult. Occasionally, tinting of the gel may be necessary.

IMPORTANT: The gel coat must be catalyzed using 2% MEK Peroxide.

8. After ample drying time, sand the area using very fine wet/dry sandpaper. If the appearance of the area is still not satisfactory, repeat steps 2 thru 4 as necessary.

9. If above the waterline, polish the area using a fiberglass rubbing compound and then wax. If the repaired area is below the waterline, the area should be primed and painted in accordance with the anti-fouling paint manufacturer's instructions.

Fiberglass gel coat, like paint, will change colors with time and exposure to light (ultraviolet). For this reason, "matching" gel coat obtained from Carver may not match the gel color of a boat that has been exposed. However, this is the closest match commercially available. A fiberglass technician can tint the gel to be used in the repair to provide a closer color match.

More severe fiberglass damage requires the expertise of a fiberglass repair technician. Repairs of structural damage should only be attempted by an experienced fiberglass technician. See a Carver dealer.

IMPORTANT: Improper repair techniques can lead to further fiberglass component damage.

WOODWORK CARE & MAINTENANCE

M-1 TEAK CARE & MAINTENANCE

Solid teakwood is used extensively on Carver boats, especially on the exterior. This wood gives a rich warm appearance with minimal maintenance. Teakwood will never rot or structurally deteriorate. Exposure to the sun and elements will only cause the wood to turn grayish white. Teak can be restored to original appearance with minimal care using teak care products that are commercially available.

Teak can be maintained dark and rich in appearance with the following care:

- a. Exposure will cause the grain of the wood to rise. This will cause it to feel and appear rough. Should this occur, lightly sand the teak using a hand sanding block and medium grit sandpaper. Sand the teak only enough to smooth the teak.
- b. Liberally apply a teakwood dressing. This will replenish the lost teak oil. Repeat the application in a few days.
- c. Reapplication of the teakwood dressing as periodically required will keep the wood dark and rich appearing.

Once the teak becomes excessively gray (weathered) more complex cleaning or bleaching is necessary to restore it. Many teak restoration products are available from any Carver dealer. Do Not varnish or paint the teak. The oil emitted by the teakwood will cause the varnish or paint to peel. For a natural teakwood appearance, Wattco Teakwood Oil or Prelude Marine Oil Finish is recommended. When proper application procedures are followed, these dressings can provide a long lasting, protective coating. Many other fine teakwood finishing materials are available. Check with a Carver dealer for recommendations on materials commonly used in the immediate area.

M-2 DECRAGARD CARE & MAINTENANCE

Many bulkheads or panels on Carver boats are of a special plywood laminate called "Decragard." This material has a teak colored veneer laminated onto the inner ply structure. Decragard should be kept clean. Periodic use of a paneling cleaner/wax and an occasional application of wood paste wax will help retard fading. **Sanding or varnishing these panels is not recommended.** Should a panel nick or gouge, stick

filler material, available at most hardware stores, can be used to fill and color the damaged area.

M-3 HIGH-PRESSURE LAMINATE CARE

Many interior countertops and the bulkheads, locker door and drawer fronts on some models are of a high pressure laminate, "formica" like material. This material can be easily cleaned using normal soap and water or other cleaning solutions designed for such materials. A fine coating of a good quality paste wax will help maintain the shine and beauty of the laminate. Some laminate materials have a deep texture and thus, are much more difficult to wax than those with a smoother finish.

M-4 PLEXIGLASS CARE

Various interior and exterior components utilize a part which is made of plexiglass. Examples are: deck hatches, port hole inserts, bottle-glass liquor cabinets, electrical center door, etc. Do not attempt to clean these surfaces with typical window cleaning agents such as "Windex," etc. The chemicals in products such as this will etch the plexiglass surface. To clean, use ammonia or a solution of ammonia, water, and vinegar.

M-5 DASH PANELS

The helm and dash assemblies, as well as the electrical center, may contain panels made of brushed metal. **Do not** attempt to clean these surfaces with abrasive material or caustic chemical cleaners. These types of cleaners will cause irreparable damage to the finish. These items can be cleaned and preserved with mild cleaning agents such as "Armorall" cleaner and polisher.

GENERAL MAINTENANCE

N-1 PRIOR TO LIFTING FOR WINTER LAYUP

Pump out the head (dockside discharge). Flush the head holding tank with soap, water and a deodorizer (e.g., Lysol Liquid). If equipped with an auxiliary holding tank (self-contained head with holding tank), transfer this solution to the holding tank using the transfer pump. Add more water if necessary. Have the cleaning solution pumped out.

Have the fuel tank(s) either completely full or completely empty. See the "Engine Owner's Manual" for recommendations. Also, check with the dry dock operators for recommendations. If winter storing with a full fuel tank, gasoline winterizer such as Sta-Bil will reduce varnishing, condensation, etc.

Drain water from the fresh water system and the hot water heater.

Winterize the engine and drive systems as recommended in the "Engine Owner's Manual" and V-drive Manual. Portions of this winterization procedure may require that the boat be lifted.

Disconnect the prop shaft couplings (inboard and V-drives). Lift the boat only at the designated "sling" labels. See Section L for additional details.

N-2 AFTER LIFTING

Remove the garboard drain plug.

Thoroughly wash the fiberglass exterior, especially the hull anti-fouling bottom. Remove as much marine growth as possible.

Locate the boat properly. Be sure it is adequately supported on a Carver cradle. The cradle should be raised slightly under the forward supports to improve drainage to the garboard drain. Be sure the cradle mates with the hull properly and does not protrude into the fiberglass.

Be sure all the water is completely drained from the fresh water system. Disconnect all hoses, check valves, etc. and blow all the water from the system using very low air pressure. The use of non-toxic, fresh water system anti-freeze is commercially available and recommended as an alternative to disassembling the water system.

Winterize the head as recommended by the head manufacturer. If the boat is equipped with a holding tank other than that in the base of a head, mix some anti-freeze solution and pour it into the head. Transfer some of the anti-freeze to the holding tank using the transfer pump or by flushing the head.

Drain or winterize the air conditioning and generator systems. Follow the appropriate manufacturer's directions. Be sure all water intake filters are drained thoroughly. Ensure that all water is removed from the bilge pumps and bilge pump lines.

Dry the hull bilge, and self-bailing cockpit drain troughs. Water freezing in these areas could cause damage.

Remove the battery and store it in a cool place. Clean the battery using clear, clean water. Be sure the battery has sufficient water and clean terminals. Keep the battery charged throughout the storage period. Do not store the battery on a concrete floor.

Spray the 120 volt (220 volt on 50 Hertz models) receptacles with a contact cleaner.

Remove the propeller(s) and grease the prop shaft with light waterproof grease.

Remove the propane tank and store it in a cool, dry place away from heat or spark.

Clean the boat interior thoroughly, vacuum carpets, and dry clean drapes and upholstery jackets.

Scrub the hull bottom and wash exterior fiberglass components, wax lightly.

Clean exterior upholstery with a good vinyl cleaner and dry thoroughly.

Remove all oxidation from exterior hardware and apply a light film of moisture - displacing lubricant.

N-3 PRIOR TO WINTER STORAGE

Remove as many cushions and hatches, and open as many locker doors, as possible. Open the ice box or refrigerator door. Leave these areas open to improve ventilation.

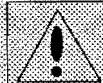
Spray the weather covers and the boat upholstery with Lysol Spray Disinfectant. Enclosed areas such as the

refrigerator, shower basin, storage locker areas, etc. should also be sprayed with Lysol.

Place small dishes of rodent poison such as D-Con in a number of areas around the boat. Be sure dishes are placed near the head and the engines, as rodents will destroy water intake and discharge hoses.

If the boat will be in outside storage, properly support a storage cover and secure it over the boat. Do Not secure the cover tightly to the boat. This does not allow adequate ventilation and can lead to dry rot. Do Not store the boat in a damp storage enclosure. Excessive dampness can cause electrical problems, corrosion, and dry rot.

Whenever possible, do not use the bimini top or convertible top canvas as a winter storage cover. The life of these canvases may be significantly shortened if exposed to harsh weather elements for long periods.



WARNING

Placing an electric or fuel burning heating unit in the bilge of the boat during cold weather can be potentially hazardous and is not recommended.

GENERAL MAINTENANCE SCHEDULE

	48 HOURS AFTER LAUNCH	25 HOUR CHECK EACH SEASON	BI-SEASON/ EACH 6 MOS/ EA. 1000 HRS	SEASONALLY / EACH 12 MOS/ EACH 200 HRS
ENGINE & DRIVE SYSTEMS				
Engine maintenance as prescribed in engine man.-----AS RECOMMENDED BY MANUFACTURER-----				
Inspect water intake connections & hoses		X	X	X
Inspect exhaust system hoses & connections	X	X	X	X
Inspect exhaust guard cover				X
Check prop for trueness				X
Check strut bearing				X
Check propellers				X
Check rudder alignment				X
Check all thru-hull fittings				X
Inspect shaft log packing nut	X	X	X	X
Check prop shaft alignment	X	X	X	X
Spray ignition switch with contact cleaner				X
Clean gauges				X
CONTROL SYSTEMS				
Throttle and shift adjustments		X		X
Test neutral safety switch				X
Inspect electric shift cable				X
Lubricate cable and control				X
STEERING SYSTEMS				
Inspect linkage and connections			X	X
Adjust rudder indicator			X	X
Adjust stern drive torque tab				X
Service power steering-----AS RECOMMENDED BY MANUFACTURER-----				
Adjust steering		X		X
Lubricate system steering				X
Inspect rudder packing nut	X	X	X	X
ELECTRICAL SYSTEMS				
Check dual battery negative bonding cable	X			
Inspect battery connections			X	X
Check battery water level		X	X	X
Inspect battery cable				X
Check operation of 12V electrical equipment		X		X
Check blower operation		X	X	X
Inspect 12V wiring and connections				X
Check operation of AC electrical equipment		X		X
Inspect shore power cord and adapter			X	X
Check operation of polarity light				X
Check receptacles and connections			X	X
Check AC wiring				X
Check AC system continuity				X
Generator maintenance-----AS RECOMMENDED BY MANUFACTURER-----				
Inspect generator water intake and exhaust		X		

48 HOURS AFTER LAUNCH	25 HOUR CHECK EACH SEASON	BI-SEASON/ EACH 6 MOS/ EA. 1000 HRS	SEASONALLY / EACH 12 MOS/ EACH 200 HRS
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FUEL SYSTEMS

Inspect for fuel leaks and condition of fuel hoses	X	X	X
Inspect fuel sender	X	X	X
Clean fuel filter	X	X	X
Inspect fuel tank			X
Check propane system for leaks	X	X	X
Check operation of propane equipment			X
Inspect propane storage system			X

FRESH WATER SYSTEM

Flush water system			X
Inspect fresh water tank			X
Inspect system	X		X

VENTILATION & DRAINAGE

Check garboard drain	X	X	X
Clean vent system		X	X
Check operation of sliding side windows			X
Clean and check operation of bilge pump(s)	X		X

INTERIOR EQUIPMENT

Head maintenance	AS RECOMMENDED BY MANUFACTURER		
Inspect thru-hull fittings	X	X	X
Clean ice box and refrigerator			X
Check stove fuel system			X
Stove maintenance	AS RECOMMENDED BY MANUFACTURER		
Clean and demagnetize stereo head			X
Clean cabin and hatch screen			X

EXTERIOR EQUIPMENT

Lubricate spotlight cable			X
Clean light		X	X
Check compass for magnetic deviation			X
Check trim tab reservoir fluid level	X	X	X
Check trim tab system for leakage			X

SEATING & WEATHER COVERS

Clean upholstery			X
Spray upholstery with Iysol			X
Check convertible seat hinges			X
Apply vinyl daub seam sealant	X		
Wash weather covers			X

FIBERGLASS COMPONENTS & HULL

Check all rail and seat fastenings			X
Clean fiberglass thoroughly		X	X
Wax hull sides and all non-tread areas			X
Inspect fiberglass areas for damage			X
Sand hull and re-apply anti-fouling paint			X
Perform minor touchup repairs			X

48 HOURS AFTER LAUNCH	25 HOUR CHECK EACH SEASON	BI-SEASON/ EACH 6 MOS/ EA. 1000 HRS	SEASONALLY / EACH 12 MOS/ EACH 200 HRS
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WOODWORK CARE & MAINTENANCE

Apply teak care products	X	X
Clean paneling	X	X
Clean mahogany woodwork		X
Touchup mahogany finish		X

IMPORTANT: These time intervals are provided only as a guideline; they assume normal operating conditions. Certain operating conditions may warrant that these procedures be performed at shorter time intervals.

NOTE: See the appropriate section of this manual and a Carver dealer for additional details regarding the preceding

OPERATION

O-1 GENERAL

Before starting the boat, become familiar with all of the various component systems and the related operation. Is all of the necessary safety equipment on-board? Are the "Rules of the Road" known and understood? Has an experienced pilot briefed you on the general operation of your new boat? Has a "Pre-Cruise Systems Check" been performed? If the answer to any of these questions is "No," read this section very carefully.

O-2 COMPONENT SYSTEMS

Before you can really enjoy your boat, a thorough understanding of its systems and their operation is essential. This manual and the associated manufacturers information are provided to enhance your knowledge of the boat. Read this information carefully.

After becoming familiar with the boat and its systems, re-read this manual. Maintenance and service tips are included to help keep the boat in like-new condition.

O-3 SAFETY EQUIPMENT

Besides the equipment installed on the boat by Carver Boat Corporation, certain other equipment is required to ensure passenger safety. A brochure listing the Federal equipment requirements is included with this manual. Remember that these laws are for your protection and are minimum requirements. Also, check your local and state regulations. Items like a sea anchor, working anchor, extra dock lines, flare pistol, a line permanently secured to your ring buoy, etc. could at some time save your passengers lives, or save your boat from damage.

The Coast Guard Auxiliary offers a "Courtesy Examination." This inspection will ensure the boat is equipped with all of the necessary safety equipment.

O-4 RULES OF THE ROAD

As in driving an automobile, there are a few rules that must be known if safe boating operation is to be maintained. The Coast Guard, Coast Guard Auxiliary, Department of Natural Resources or your local boat club sponsor courses in boat handling, including rules of the road. Such courses are strongly recommended. Books on this subject are also available from local libraries.

O-5 PRE-CRUISE SYSTEM CHECK

Before leaving the dock, the following items should be checked:

A. Before Starting The Engines

1. Check the weather forecast. Determine if the cruise planned can be made safely.
2. Check the bilge water level. Check the engine and drive fluid levels. Look for other signs of potential problems. Check for the scent of fuel fumes.
3. Set the Battery Selector Switch to the desired position. See section E.
4. Activate the Bilge Blower. Check the blower output.
5. Be sure all necessary safety equipment is on-board and operative. This includes items such as the running lights, spotlight, life saving devices, etc.
6. Be sure the Dockside shore power cord is disconnected.
7. Be sure the Dockside Water Supply Line is disconnected.
8. Ensure an adequate amount of fuel is on board.
9. Be sure you have sufficient water and other provisions on board for the cruise planned.
10. Leave a written message listing details of the planned cruise with a close friend ashore.

B. After Starting The Engine

11. Visibly check the engine to be sure there are no apparent water or oil leaks.
12. Check the gauges. Make sure the oil pressure, water temperature, voltmeter, etc. are reading normally.
13. Have a safe cruise and enjoy yourself.

0-6 GROUNDING & TOWING



WARNING

If the boat should become disabled, or if assisting another craft that is disabled, great care must be taken. The stress applied to a boat during towing may become excessive. Excessive stress can damage the structure of the boat and create a safety hazard for those aboard.

Carver Boats are not designed nor intended to be used as a towing vessel. The mooring cleats on Carver boats are not designed or intended to be used for towing purposes. These cleats are specifically designed as mooring cleats for securing the boat to a dock, pier, etc. **DO NOT** use these fittings for towing or attempting to free a grounded vessel.

Freeing a grounded vessel or towing a boat that is disabled requires specialized equipment and knowledge. Line failure and structural damage caused by improper towing have resulted in fatal injuries. Because of this, Carver strongly suggests that these activities be left to those who have the equipment and knowledge such as the U.S. Coast Guard, to safely accomplish the towing task.



WARNING

Running aground can cause serious damage to a boat and associated underwater gear. If the boat should become grounded, distribute personal flotation devices and inspect the boat for possible damage. Thoroughly inspect the bilge area for signs of leakage. An experienced service facility should check the underwater gear at the first opportunity. **Do Not** continue to use the boat if the condition of the underwater equipment is questionable.

0-7 GLOSSARY

ABAF - Toward the rear of a boat.

ABEAM - At right angles to the keel of the boat.

ABOARD - On the boat.

ABREAST - Side by side.

ADRIFT - Loose, not on moorings or towline.

AFT - Moving toward the stern, you are going aft.

AGROUND - Struck fast to the bottom.

AHEAD - In a forward direction.

AIRMASSES - A region of the lower atmosphere where the air that moves across it is similar in pressure, temperature, and humidity.

ALEE - Away from the direction of the wind; opposite of windward.

ALOFT - Above the deck.

AMIDSHIPS - 1. An object or area midway between the bow and stern. 2. An object or area midway between the port side and the starboard side of a vessel.

AMPERE - The standard unit used to measure the strength of an electrical current.

ANCHOR RODE - The line (chain) connecting a vessel to its anchor.

ANCHOR BALL - A black, circular, day signal hoisted to show that a vessel is anchored. Replaced at dusk by the anchor light.

ASTERN - In back of the boat, opposite of ahead.

ATHWARTSHIPS - A line, or anything else, running perpendicular to the fore-and-aft center line.

BATTEN - A strip of wood or metal used to secure tarpaulin(s) in place over a hatch. To batten down means to secure for rough weather.

BEAM - 1. The widest distance across a boat from the outside skin on one side to the outside skin on the other. 2. A transverse structural member that stiffens and supports a portion of the deck.

BEAM WIND - A wind blowing against the side of the vessel, perpendicular to the long axis of the vessel.

BELAY - 1. To secure or make fast. 2. To cancel or stop action.

BILGE - The lowest interior area of a hull, used to collect water that has entered.

BILGE PUMP - A pump intended for removal of spray, rainwater, and the normal accumulation of water due to seepage and spillage; not intended for damage control.

BINNACLE - The stand or support for a magnetic compass.

BITT - A heavy and firmly mounted piece of wood or metal used for securing lines.

BLOCK - A wooden or metal case enclosing one or more pulleys, allowing a hook, eye, or strap by which it may be attached.

BOLLARD - A single post (wood, metal, or concrete) on a dock, pier, or wharf used to secure a vessel's lines.

BONDING - The electrical connection of exposed metallic, non-current carrying components to a common point on the main engine block.

BOW - The front end of the boat.

BOW LINE - A docking line leading from the bow.

BREAKER - A single breaking plunging or spilling wave.

BREAKER LINE - The outer limit of the surf. However, all breakers may not be in a line. they can occur outside the breaker line.

BRIDGE - The main steering and speed station from which a vessel is controlled.

BROACH - The turning of a boat parallel to the waves, subjecting it to possible capsizing.

BULKHEAD - The interior walls of a boat.

BULKWARK - The side of a vessel when carried above the level of the deck.

BUOY - An anchored float used for marking a position on the water, a hazard, or a shoal.

CAPSIZE - To turn over.

CAPSTAN - A machine that moves a cylindrical device on a shaft for the purpose of hauling up an anchor.

CAST OFF - To let go.

CATAMARAN - A twin-hulled boat, with the hulls being side-by-side.

CHINE - The turn of a boat's hull below the water line. If this turn is rounded, it is a "soft" chine. If the turn is squared off, it is a "hard" chine.

CHOCK - 1. A fitting or hole in a railing or deck through which a mooring or anchor line is routed. 2. A wedge used to secure an item in place.

CIRCUIT BREAKER - A device used to interrupt an electrical circuit when current flow exceeds a predetermined level.

CLEAT - A double-ended deck fitting to which lines are secured; usually anvil-shaped.

COAMINGS - Raised lips around hatches used to keep water from entering via the hatchways.

COCKPIT - An exposed deck area (usually aft) that is substantially lower than the adjacent deck.

COMBER - A wave on the point of breaking. A comber has a thin line of white water on its crest, known as "feathering."

COMPANIONWAY - The steps or ladder leading downward from a deck.

COMPARTMENTS - Rooms divided by bulkheads.

COUNTER - The overhang at the stern of a boat.

CRADLE - A framework, generally made of wood, used to support a boat when it is out of the water.

CREST - The top of a wave, breaker or swell.

CUDDY - A small sheltered cabin in a boat.

CURRENT - The movement of water.

DEAD AHEAD - Directly in front of the boat.

DEAD RECKONING - A plot of courses steered and distances traveled through the water.

DECK - A permanent covering over a compartment, hull or any part thereof.

DINGHY - A small, open boat used for ship to shore transportation.

DISPLACEMENT - The weight of water displaced by the hull of a vessel.

DISPLACEMENT HULL - A hull that "displaces" a volume of water equal to the weight of the boat. A hull designed to run in the water rather than on top of the water. When a displacement hull moves through the water, it pushes that water out of the way. Water will then flow around the hull and fill the "hole" the boat leaves astern. issued by the U.S. Coast Guard. Documented yachts do not show state I.D. numbers.

DOLPHIN - A group of piles driven close together and bound with wire cables into a single structure.

DRAFT - 1. The depth of a boat from the actual water

line to the bottom of the lowest part of the boat (e.g., the propeller tip or rudder). 2. The depth of water necessary to float a boat.

DROGUE - Any device streamed astern to check a vessel's speed, or to keep its stern up to the waves in a following sea.

DYE MARKER - A brightly colored chemical that spreads when released into water; normally used to attract attention.

EBB TIDE - A receding tide.

EVEN KEEL - To be floating evenly without listing to either side.

EXHAUST SYSTEM - The means by which the hot engine (or generator) exhaust gases are moved from the engine to an outboard device and then released into atmosphere.

EYE SPLICE - A permanent loop spliced in the end of a line.

FAST - Said of an object that is secured to another.

FATHOM - Six feet.

FENDER - A device (usually constructed of rubber or plastic) position so as to absorb the impact between vessels or dock.

FETCH - The unobstructed distance that the wind can blow over the water to create waves.

FLARE - 1. Outboard curve of the hull as it comes up the side from the waterline; the reverse of tumble home. 2. A pyrotechnic device used for emergency signaling.

FLAT - A small deck that is built below decks, specifically to support a piece of equipment.

FLEMISH - To coil down a line or rope on deck in a flat, circular, concentric arrangement.

FLOTSAM - Floating wreckage, trash or debris.

FLUKE - The palm of an anchor.

FLYBIRDGE - A steering and speed control station located above the main cabin or salon.

FOAM CREST - The top of the foaming water that speeds toward the beach after a wave has broken, commonly referred to as "white water."

FOLLOWING SEA - A sea (waves) moving in the same direction as a vessel.

FORE-AND-AFT - A line, or anything else, that runs parallel to the longitudinal center line of a boat.

FOREFOOT - The portion of a vessel's keel that curves upward to meet the stem.

FOREPEAK - A compartment in the bow of a small boat.

FORWARD - Toward the bow.

FRAME - A rib that supports the deck and hull and provides the vessel transverse strength.

FREEBOARD - The minimum vertical distance from the surface of the water to the gunwale.

FREQUENCY - The number of crests passing a fixed point at a given time.

FRONTS - Where opposing warm and cold air masses meet, generally producing a band of wet, stormy weather wherever they meet.

GAFF - A spar that is used to support the head of a gaff sail.

GALLEY - The kitchen area of a boat.

GALVANIC CORROSION - A potential electrical difference exists between dissimilar metals immersed in a conductive solution (e.g., salt water). If these metals touch or are otherwise electrically connected, this potential difference produces an electron flow between them. The attack on the less corrosion resistant metal is usually increase and the attack on the more resistant metal is decreased, as compared to when these metals are not touching.

GANGWAY - The area of a ship's side where people board and disembark.

GASKET - A strip of sealing material, usually rubber, set along the edge of a water or gas tight door, port, cover or hatch.

GELCOAT - The thin outer layer of pigmented plastic covering a fiberglass vessel.

GLAND - The movable part of a stuffing box, which when tightened, compresses the packing.

GROUND - Electrically this term applies to the electrical potential of the earth's surface, which is zero.

GROUND SPEED - A vessel's speed made good over the surface along a course or track.

GROUND TACKLE - The anchor, anchor rode, and other fittings that are used to secure a vessel at anchor or dockside.

GUNWALE - 1. The line where the upper deck and the hull meet. 2. The upper edge of a boat's side.

HALYARD - A line used to hoist a flag or pennant.

HATCHES - Cover on hatchways.

HATCHWAYS - Access ways through decks.

HARDTOP - A permanent cover over the cabin or cockpit.

HAWSER - A heavy rope or cable used for mooring or towing.

HEAD - A toilet or lavatory area.

HEADING - The direction that a vessel is going with reference to true, magnetic, or compass north.

HEADWAY - The forward motion of a vessel through the water.

HEAVE TO - To bring a vessel up in a position where it will maintain little or no headway, usually with the bow into the wind.

HEAVY WEATHER - Stormy weather with high seas and strong winds.

HEEL - To tip to one side.

HELM - The wheel or tiller that is controlling the rudder.

HELMSMAN - The individual steering the vessel.

HIGHS - A center of pressure surrounded by lower pressure on all sides. Caused by a mass of cooler, sinking, drier air. This raises the area ground level air pressure and provides clear skies.

HULL - The main body of a boat.

INBOARD - 1. From either the port or starboard side of a boat to the fore-and-aft centerline of a boat. 2. The lock of a moored boat.

INLAND RULES - Nautical "Rules-of-the-Road" that apply in U.S. lakes, rivers, and coastal waters.

INTERNATIONAL RULES - Nautical "Rules-of-the-Road" that are in effect by international agreement to the high seas.

ISOBARS - Lines of equal air pressure that connect all the local points on a weather map. These lines are usually closed and define high or low pressure air masses.

ISOTHERMS - Isotherms are lines are similar to isobars except that isotherms connect all the points that are of equal temperature.

JETSAM - Refuse that sinks when discharged overboard.

KEDGE(S) - One or more anchors set out from a grounded vessel, usually astern, to 1) keep it from being driven further aground and 2) to aid in refloating.

KEEL - The centerline of a boat running fore and aft: the backbone of a vessel.

KETCH - A two-masted sailboat with the smaller after mast stepped ahead of the rudder post.

KNOT - 1. A maritime unit of speed equal to one nautical mile per hour (6076 feet). 2. A term for hitches and bends.

LANYARD - A short line made fast to an object to secure it.

LATITUDE - The measure of angular distance in degrees, minutes, and seconds, north or south of the equator.

LAZARETTE - Storage compartment in the deck at the stern.

LEADLINE - A weighted line used to take depth measurements.

LEE - The direction opposite that of the wind.

LEEWARD - Away from the wind.

LIST - A vessel that inclines to port or starboard.

LORAN - Long Range Navigation. An electronic system whereby a navigator can determine position regardless of weather.

LONGITUDINAL - Running lengthwise.

LOWS - The absence of an air mass. Hurricanes are extremely concentrated low pressure systems.

LUBBER LINE - A mark or line on the compass parallel to the keel indicating forward.

MAST - A spar that is set upright to support rigging and sails.

MIZZEN - The after and smaller mast of a ketch or yawl; also a sail set on that mast.

MOORING - An arrangement for securing a boat to a mooring buoy or pier.

NAVIGATION LIGHTS - A set of red and green or white lights which must be shown by all vessels between dusk and dawn.

OVERHEAD - A ceiling or roof of a vessel.

OVERBOARD - Over the side of the boat.

OUTBOARD - 1. From the fore-and-aft centerline of a boat toward both the port and starboard sides. 2. The seaward side of a moored boat.

PAINTER - A line in the bow of a small boat used for making fast.

PASSAGEWAY - A corridor or hallway aboard ship.

PENNANT - The line by which a boat is made fast to a mooring buoy; also pendant.

PERSONAL FLOATATION DEVICE (PFD) - A life preserver.

PIER - A loading platform that extends at an angle from the shore.

PILASTER - A rectangular structural support column that is an extension of the port and starboard aft cabin sides and which supports the hardtop and flybridge.

PILING - Support, protection for wharves, piers, etc.

PITCH - 1. The vertical (up and down) motion of a bow in a seaway, about the athwartships axis. 2. The axial advance of a propeller during one complete revolution.

PITCHPOLING - A boat being thrown end-over-end.

PLANING HULL - At slow speeds, a planing hull will displace water in the same as a displacement hull. As speed is increased, hull provides a lifting effect up onto the surface of the water.

POINT - One of 32 points of the compass that is equal

to 11-1/4 degrees.

PORT - 1. Looking forward, the left side of the bow to stern. 2. A harbor.

PORT BEAM - The left-center of a boat.

PORT BOW - Facing the bow, the front left side.

PORT QUARTER - Looking forward, a vessel's left rear section.

QUARTER - The sides of a boat aft of amidships.

QUARTERING SEA - Sea coming on a boat's quarter.

RED-RIGHT-RETURNING - A term for helmsmen that buoys and day marker are on the right when returning from seaward.

REEF - To reduce the sail area.

REEVE - To pass a line through a block or other opening.

RIDGES - High pressure fingers extending out from a high.

RODE - The anchor line or chain.

RUNNING LIGHTS - Lights required to be shown on boats underway between sundown and sunup.

RUDDER - A vertical plate or board for steering a boat.

SALON - The main social cabin on a vessel, usually the largest area, occasionally referred to as the deckhouse.

SCREW - A propeller.

SCUPPER - A drain from the edge of a deck that discharges overboard.

SEACOCK - A positive action shut-off valve connected directly to the hull seawater intake and discharge piping.

SERIES - A group of waves which seem to travel together and at about the same speed.

SHACKLE - A "U" shaped connector with a pin or bolt across the open end.

SHAFT - The long, round member that connects the engine or transmission to the propeller.

SHAFT LOG - A fitting at the hull bottom where the shaft connecting an engine to its propeller penetrates the

hull. A shaft log permits the shaft to rotate while simultaneously preventing water from entering the hull.

SHEER - The top of the hull's curvature at the deck line from the bow to the stern.

SHEER STRAKE - The upper edge of the hull, immediately below the deck.

SHEET - The line used to control the forward or athwartships movement of a sail.

SHEET BEND - A knot used to join tow ropes.

SHOAL - An area of shallow water.

SILENCER - A baffled chamber installed in an exhaust system to reduce the noise.

SOLE - Term for deck.

SPAR - A general term for booms, masts, yards etc.

SPRING LINE - A pivot line used in docking, undocking, or to prevent the boat from moving forward or astern while made fast to a dock.

STARBOARD - Looking forward, the entire right side of a boat from bow to stern.

STARBOARD BEAM - The right-center of a boat.

STARBOARD BOW - When facing the bow, the front right side.

STARBOARD QUARTER - When looking forward, the right rear section of the boat.

STEERAGEWAY - The lowest speed at which a vessel can be controlled by the steering wheel.

STEM - The leading edge of a boat's hull.

STERN - The back of a boat.

STRINGER - A fore and aft continuous member used to provide a vessel longitudinal strength.

STRUT - A propeller shaft support that is below the hull.

SUMP - A pit or well into which water is drained.

SUPERSTRUCTURE - Deck houses and other structures extending above the deck.

TACK - To come about; the lower forward corner of a sail; sailing with the wind on a given side of the boat, as

starboard or port tack.

THWART - A seat or brace running laterally across a boat.

THWARTSHIPS - At right angles to the centerline.

TILLER - A bar or handle for turning a boat's rudder.

TOPSIDE - To go up to the top deck.

TRANSOM - The stern cross-section of a square sterned boat.

TRANSVERSE - Across the vessel athwartships.

TRIM - Fore and aft balance of a boat.

TROUGH - 1. The valley that exists between waves. 2. A trough is the opposite of a ridge in that it is an elongated low-pressure area extending out from a low. A trough normally indicates unsettled weather.

TUMBLE HOME - The opposite of flare. The shape of the hull as it moves outboard going down from the gunwale to the waterline.

UNDERWAY - Vessel when not moored, at anchor, or aground.

V-BOTTOM - A hull with the bottom section in the shape of a "V."

V DRIVE - A drive system that has the output of the engine facing forward and coupled to a transmission. The prop shaft is then coupled to the transmission.

WAKE - Moving waves, track or path that a boat leaves behind it when moving across the water.

WATER LINE - The line of the water on the hull when the vessel is afloat.

WATCH - A 4 hour duty period while at sea.

WAVES - Waves are periodic disturbances of the sea's surface, caused by wind, seaquakes, and the gravitational pull of the moon and the sun.

WAVE GRADIENT - A wave's slope or angle from trough to crest.

WAVE HEIGHT - From the bottom of a wave's trough to the top of the crest.

WEATHER DECK - A deck with no overhead protection.

WEB FRAME - A frame that has a deep web, usually a main strength member.

WET EXHAUST - This term refers to an exhaust system where the cooling seawater is mixed with the exhaust gases just after the riser. This mixture is then ejected from ports located in the transom.

WHARF - a man-made structure bounding the edge of a dock and built along the shoreline.

WHIPPING - The act of wrapping the end of a piece of rope with small line, tape or plastic to prevent it from fraying.

WINDLASS - A device used to raise and lower the anchor.

WINDWARD - Toward the direction from which the wind is coming.

YAW - To swing off course, as when due to the impact of a following or quartering sea.

YAWL - A two-masted sailboat with the small mizzen mast stepped abaft the rubber post.